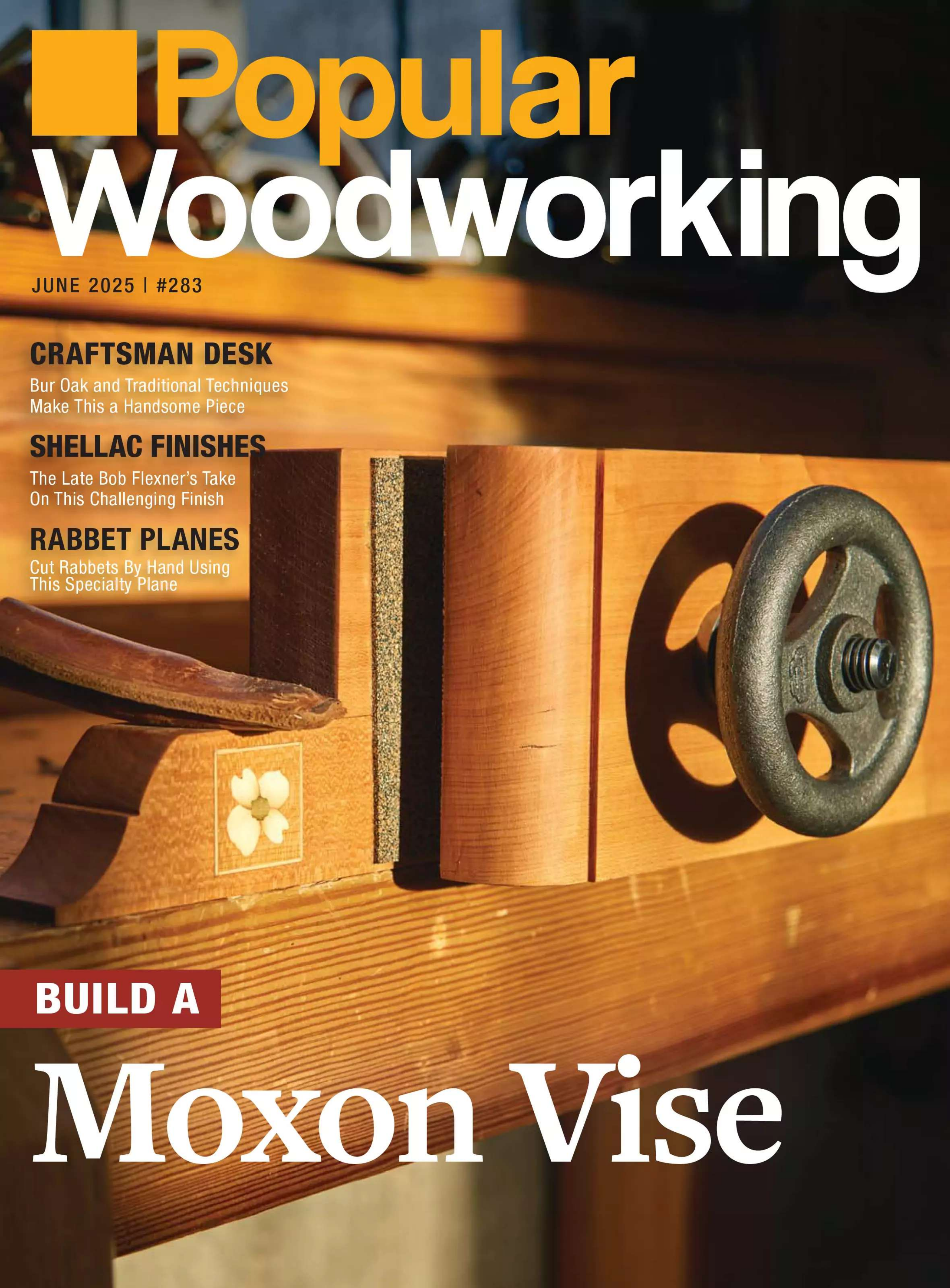

Popular Woodworking

JUNE 2025 | #283

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Make This a Handsome Piece

SHELLAC FINISHES

The Late Bob Flexner's Take
On This Challenging Finish

RABBET PLANES

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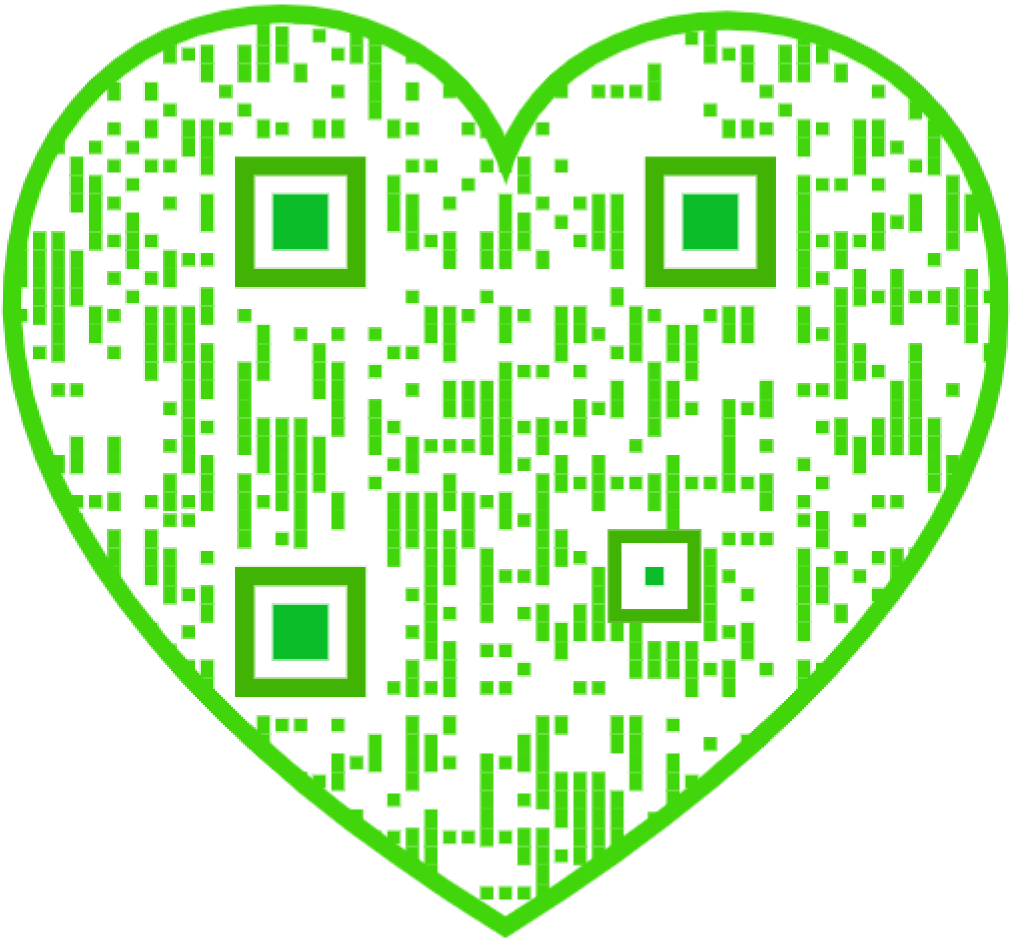
This Specialty Plane

BUILD A
Moxon Vise



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G0999

ONLY

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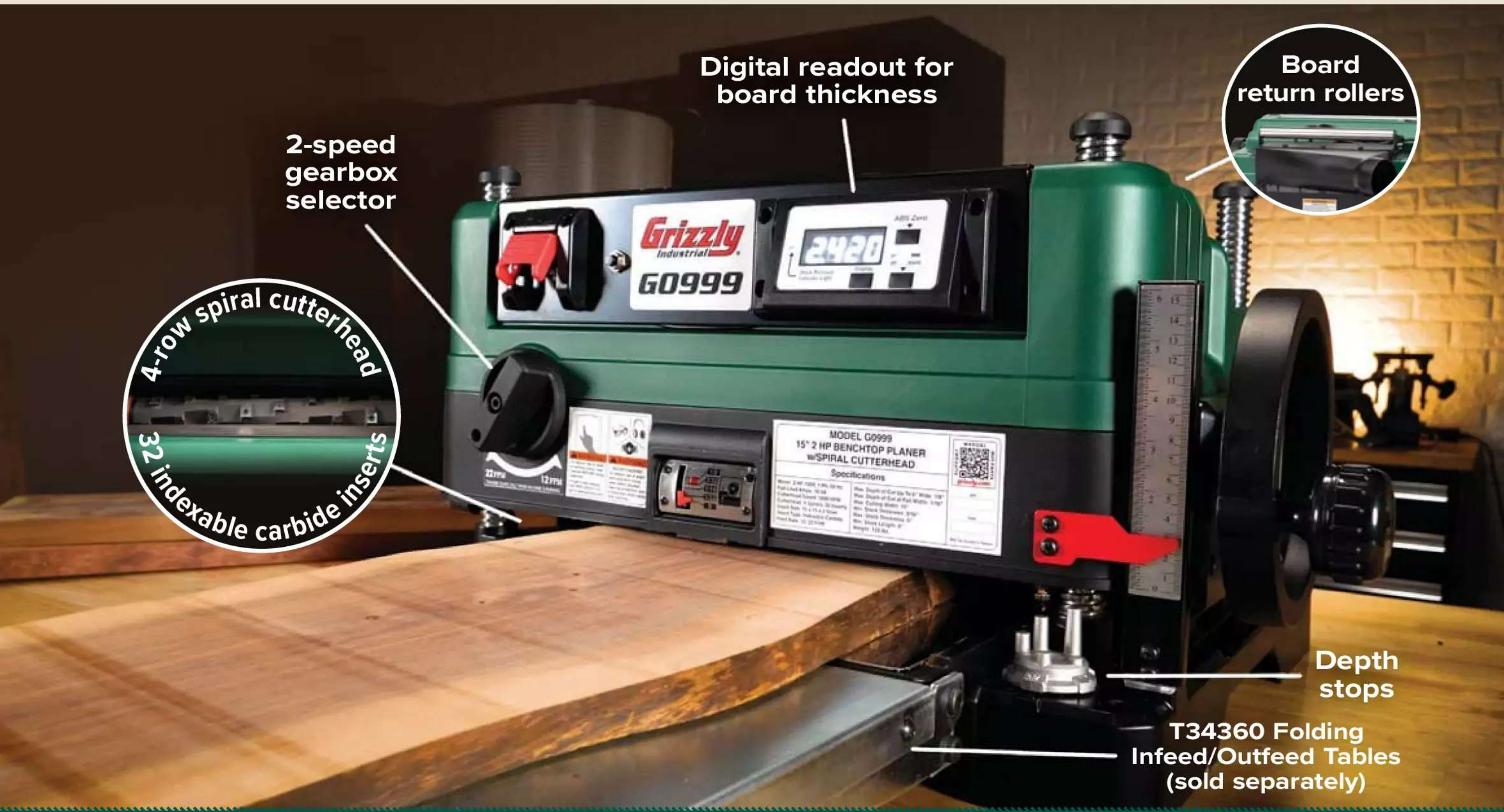

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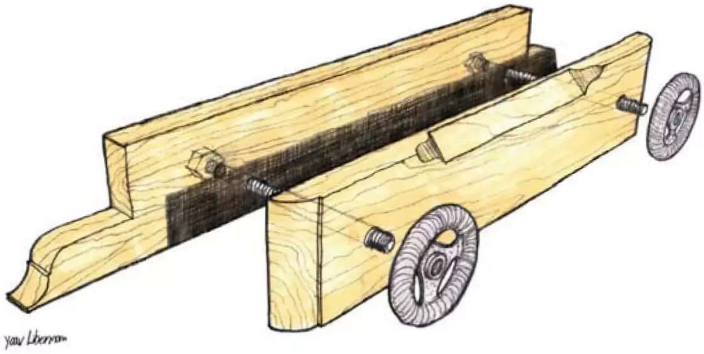

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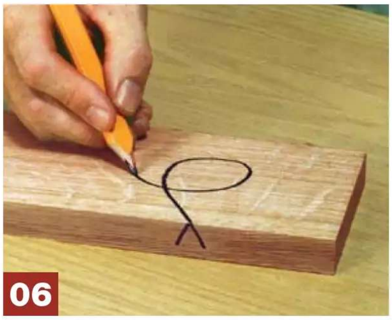
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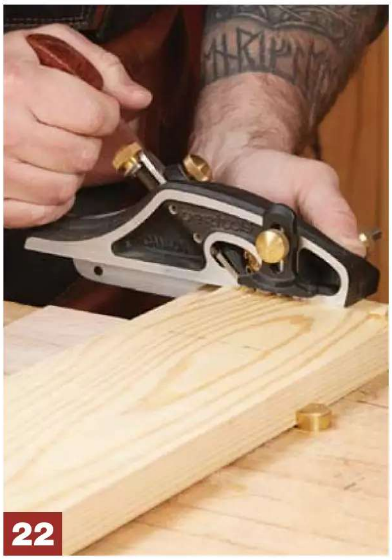
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FROM THE EDITOR

An Open Mind

By Logan Wittmer

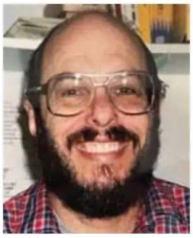
It pains me to admit this, but I am a lousy woodworking dad. My oldest son (age 10) occasionally asks me to help him build something. 95% of the time, I've been in the shop all day, so the answer is, "Ask me tomorrow." Over the last year or so, I have realized that maybe the best thing I can do for him is to teach him to use his hands—help him create something. I've tried to get him into the shop with that in mind. We started with drawknives and spokeshaves. He's crafted an armory full of wood swords, daggers, and shields (to my wife's dismay).

Several months back, he asked me if we could get a 3D printer to help with his building projects. My initial reaction was that I didn't want to try to learn a new machine or software to help him with his "projects inevitably." My compromise is to learn to model stuff using a 3D program, and I'll buy you one. I assumed that he'd lose interest in a few hours. I was wrong, and I'm a man of my word. We ordered a mid-tier printer, and both started using it.

My perception was that a 3D printer was a gimmicky thing. You'd print knickknacks, and that was it. It would lose the appeal. I'm brave enough to admit when I am wrong. I've found so many helpful shop projects to print on this thing that it may called "Dad's printer" now. Take these little spacers shown above. I ran a batch of four different thicknesses—they're handy when fitting doors and drawers, as set-up blocks, etc. I now have various tool holders around the shop and a complete set of drawers for all my sandpaper. And I've done it without building a single file from scratch. There are hundreds of thousands of free models that you can use. So, long story short, don't be surprised if you see an upcoming article on 3D printing projects for the shop. In fact, one of our writers, Alma Villalobos, submitted an article on shop 3D printing several years ago, but I dismissed the subject. Again, admitting when I'm wrong). Don't worry, we'll never become a maker magazine. Instead, keep an open mind on how some of these items could help enhance your shop time. Cheers!

Logan Wittmer

ABOUT THE AUTHORS



BOB FLEXNER (1940-2024): *Shellac: A Challenging Finish – pg. 16*

Bob Flexner was a contributing editor to Popular Woodworking for over a decade. He was one of the most respected experts on every aspect of finishing and repairing finish. Bob cut his chops woodworking when he opened a one-man shop building and restoring furniture. Over his career, Bob taught hundreds of classes on finishing, and his books have sold over 750,000 copies world wide.

ALBERT KLEINE: *Moxon Vise - pg. 30*

Albert Kleine is a self-taught woodworker based out of a small shed in suburban Washington, D.C. Over the past decade, he has focused heavily on fine box making, more recently delving into carving, marquetry, and other decorative aspects of woodworking. He teaches in-person and virtually and plans on expanding classes to his home shop. His book, Complete Starter Guide to Making Wooden Boxes, was released by Fox Chapel Publishing in the Spring of 2025. Outside of woodworking, Albert is an economist at his day job and the proud father of Maximilian.

Popular Woodworking

June 2025, Vol. 45, No. 3

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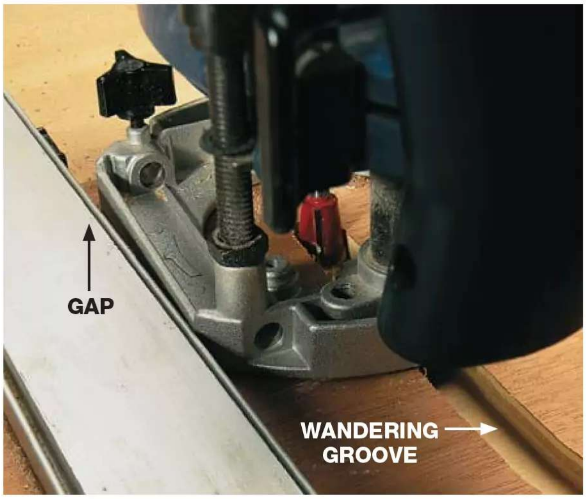
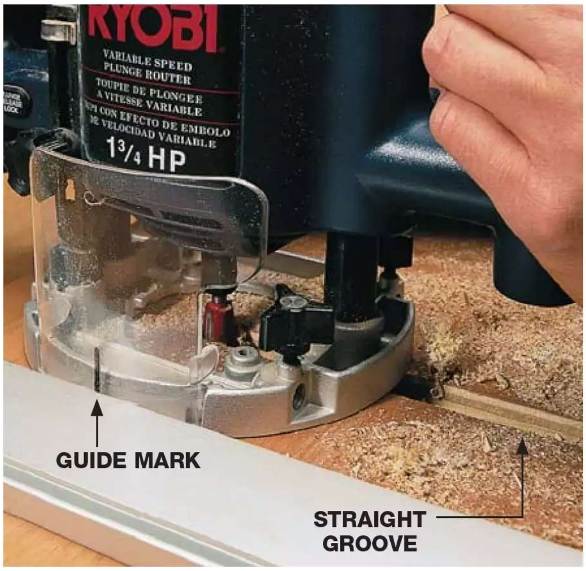


Oops!

I was cutting a sliding dovetail when my concentration wandered for a split second, and wouldn't you know it, I turned it into a *wandering* dovetail! Using the flat edge of the router seemed foolproof, but I realized that a little twitch can create a huge error.

Now I always use the round edge of the router base as a guide instead. But I found out that my plunge router's collet isn't exactly in the middle of the base. Slightly turning the base for comfort as I routed also made a wandering groove, so I've marked one single spot on the base and keep that spot tight against the fence.



3-4-5 Square

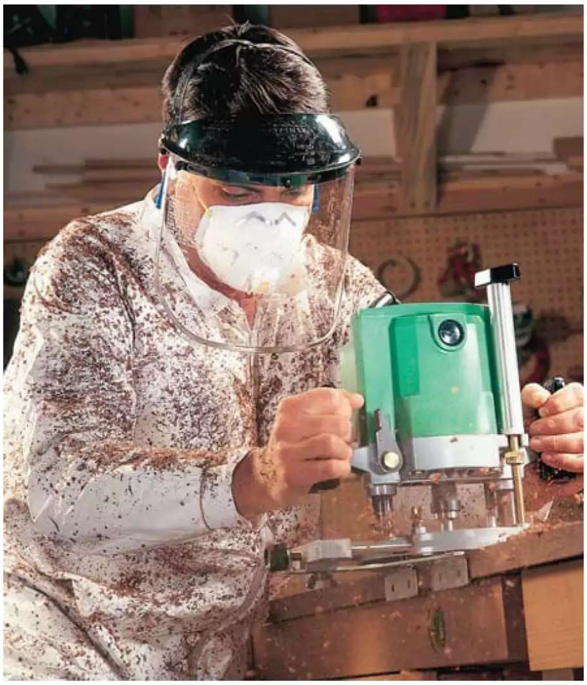
If you want to check something for square, try using the carpenter's 3-4-5 Method. If one leg of the triangle measures 3", and the second measures 4", the hypotenuse must be 5" if the corner is square. This also works with 6, 8, 10; 12, 16, 20; and so on. Any units of measurement will do, as long as you use multiples of 3-4-5.

Dress for Dust

Do the clothes really make the man? Try taking a tip from turners and dress up for dust. Wear a jumpsuit and a face shield when you can't collect sawdust at the source.

This is the outfit turners wear when they're making lots of chips. A jumpsuit is easy to brush off when you're done because it doesn't have any nooks or crannies for dust to get caught in. You can leave your dusty jumpsuit right in the shop.

The face shield is more effective than many safety glasses for keeping dust from getting in your eyes at a critical moment. It's also a first line of defense against breathing in sawdust, but remember to wear a dust mask as well.



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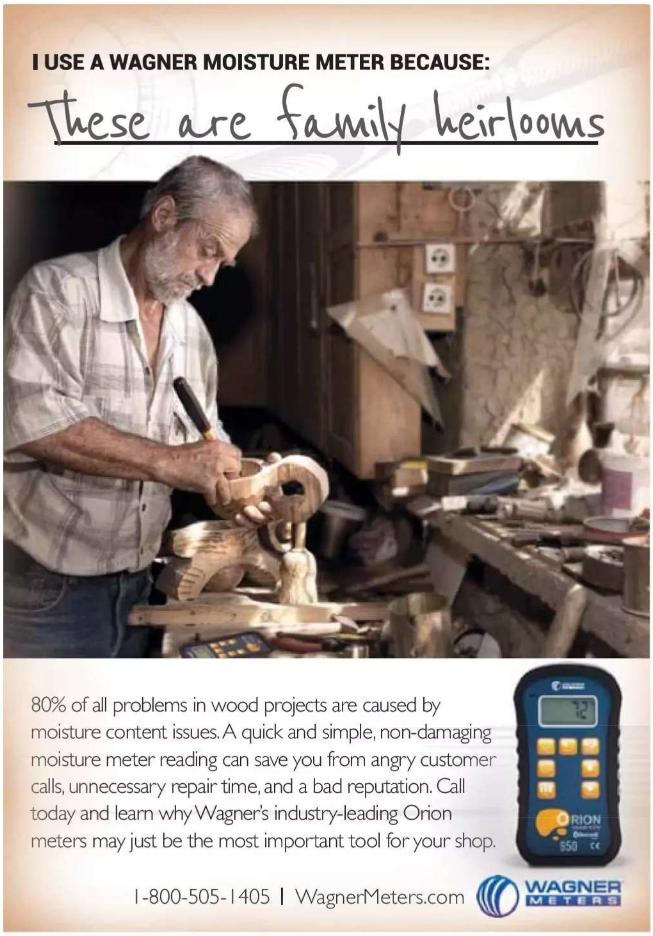

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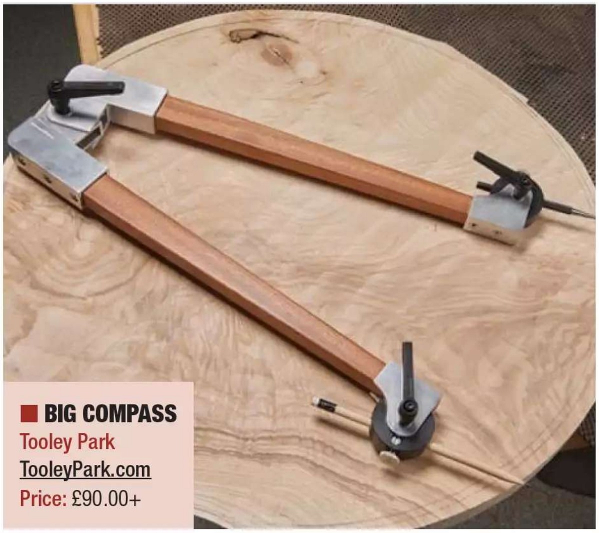
NEW TOOLS

Tooley Park Big Compass Kit



BIG COMPASS
Tooley Park
TooleyPark.com
Price: £90.00+

A few issues ago, Popular Woodworking shared a set of scribers from a company in the UK called *Tooley Park*. *Tooley Park* recently released a new tool called their "Big Compass" tool. You can see this in the photo to the right.

The big compass uses a pair of scriber-like ends and a hinge. The ends and hinge feature a large locking lever to position them in place and lock them securely. In this compass you see here, I installed a pencil on one end and a scribe on the other (included in the kit—more on that in a minute). The size of this compass makes it extremely valuable when I'm working on cutting big blanks out for lathe work. However, this large compass is useful for curved work, not only for turning.

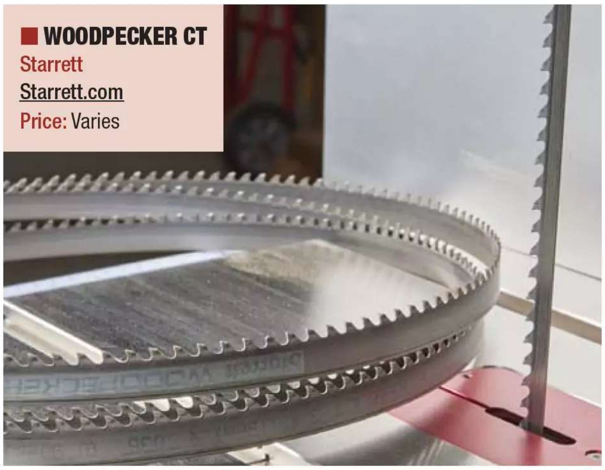
The Big Compass is available in a few different configurations. You can buy the hardware only and make your legs (in whatever length and material that you want). Another option is to buy a compass with legs, choosing either sapele or walnut. Both hardware and kit are available with two different clamping mechanisms. The deluxe version uses the same clamp as the UBB scriber, holding tools between 5.5 and 10mm. —*Pat Carroll*

Connect

NEW TOOLS

Woodpecker CT Blades by Starrett

WOODPECKER CT
Starrett
Starrett.com
Price: Varies

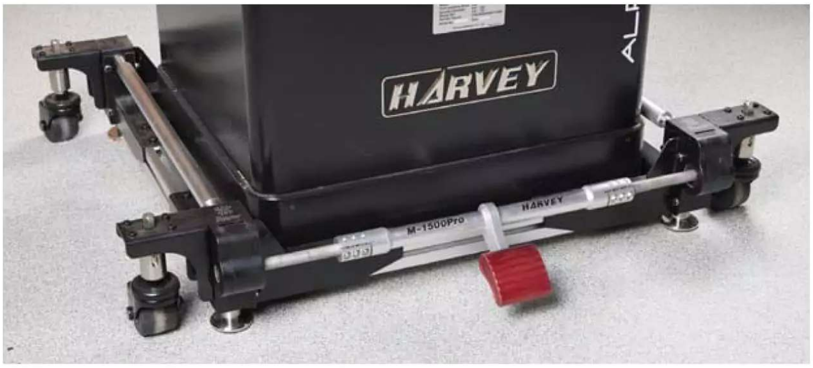


Over the last year or so, I've transitioned almost all of my bandsaw blades to be carbide-tipped. This started on my bandsaw mill and has slowly migrated into the shop. When *Starrett* (yes, the same Starrett that's been making precision machinist tools for 140 years) released their new carbide-tipped bandsaw blades, I knew that I wanted to try a few out.

As you'd expect, the *Starrett* blades are stellar. (*Starret*t has made bandsaw blades for years, so they're not new to this market). The carbide-tipped teeth are ground with alternating profiles. They cut very quickly. Honestly, though, the real thing that stood out to me was that the Woodpecker CT blades were available in widths of down to 1/2". Most carbide-tipped blades are wider for resawing purposes. As a woodturner, I often rough out bowl blanks at the bandsaw and need the narrower blade to cut curves. The carbide teeth are extremely abrasion resistant, so I can cut through abrasive bark and nasty wood without worrying about the blade dulling almost immediately. In fact, yesterday I cut through two nails in a blank, and the blade didn't bat an eye. The wider 3/4" the blade is excellent for resawing—in fact, virtually all the oak used on the desk later in this issue went through the 3/4" Woodpecker CT blade. — *Logan Wittmer*

Harvey's Spider M-1500 Pro Mobile Base

SPIDER M-1500/ M-1500 PRO
Harvey Industries
HarveyWoodworking.com
Price: $299.00/$469.00



Having the ability to move stuff around in a shop is key. This is especially true when it comes to a small shop. It is invaluable to move a tool into a workspace, set it up, and then store it when you're done. The problem that I've had is that most "integrated" mobile bases are junk. Generic aftermarket mobile bases never fit correctly and get snagged on the first plane shaving that they roll over. When I first saw the *Harvey* Spider bases at IWF in Atlanta (2024), it looked promising. And they did not disappoint.

The biggest difference between the M-1500 Pro and other bases is that four support feet simultaneously lower when you push the foot pedal. I currently have it on the *Harvey* Alpha Shaper, and this thing is rock solid when the feet are deployed. The feet are spring-loaded, so if you have an uneven floor, the feet still find a solid perch.

Raising the foot lever brings the feet up, allowing it to sit on the four casters. These casters are unbelievably smooth. With this 600lb shaper, I can twirl and spin the machine with one or two fingers. What's even more nuts is that the Pro has a weight capacity of 1,500 pounds. That will handle all but the heaviest machines.

The Spider bases are available in two versions. The M-1500 Pro is what I've shown here on the shaper. The four casters on the Pro are swivel, so they will move in any direction and have four support feet. The standard M-1500 has two fixed wheels and two support feet (shopping cart steering). The extra money is well worth having the four swivel casters and support feet. — *Logan Wittmer*

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WORKSHOP TIPS

PHOTOS BY MIKE HABERMANN & BILL ZUEHLKE

Strain Your Varnish

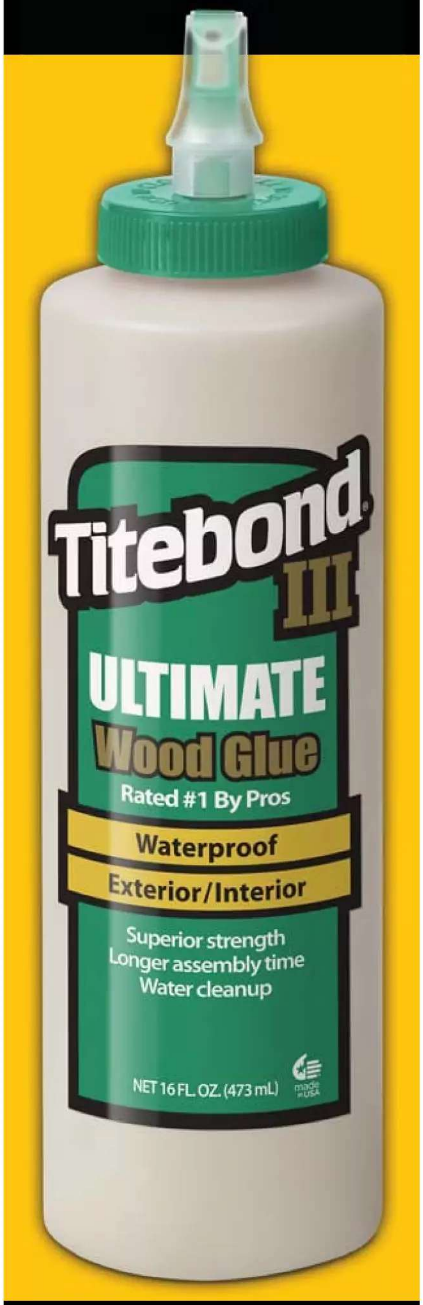
Have you ever tried to use varnish from a skinned-over, half-used can? Even if you remove the skin carefully, lumps of dried finish get mixed in with the remaining varnish and eventually end up on your project. But don't throw the stuff away—there's an easy way to get clean varnish from a used can. Just pour the contents through a paint filter into a second container. The filter is a paper cone with a cheesecloth nose (available at paint stores and home centers). Working from a second container is a good idea anyway—it keeps the storage can from getting messed up. The brush often transfers bits of junk it picks up from the surface back to the container, so clean the leftovers again when you pour them back into the storage can. You can use the same filter if it hasn't dried out.

PHOTO BY PATRICK HUBERMANN

Glue Metal to Wood

Epoxy bonds many kinds of materials to one another, including wood, metal, fiberglass, masonry, tile, concrete, and plaster. It will not, however, bond to most plastics. **TIP:** On anodized metal surfaces, such as aluminum T-track, you must sand off the coating before gluing. Epoxy doesn't stick well to anodized surfaces.

STRONGER


Titebond III
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Superior strength
Longer assembly time
Water cleanup
NET 16 FL. OZ. (473 mL)
made in USA

RATED #1 BY PROS

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1.800.347.GLUE

NEW TOOLS

Veritas Hacking Knife

veritas CANADA A2

HACKING KNIFE
Veritas
Lee-Valley.com
Price: $84.00

Of all the tools in my shop, I probably use a knife the most. Oftentimes, it's something as simple as cutting open a box or opening a bag of hardware. But, sometimes I need a knife with a little more oompf. The Hacking Knife, from *Veritas*, is just that.

Picking up this knife, you know it's built differently. The A2 blade is thick. The blade and tang are milled out of a solid block of 3/16" thick materia. The wide single bevel is akin to a cleaver. This stout shape allows you to use a mallet to hack the knife through dense material, such as splitting wedges for chairs or breaking up material for the shop wood stove. And, I have to assume, with a name like "Hacking Knife," that the folks at Veritas are inviting you to abuse it.

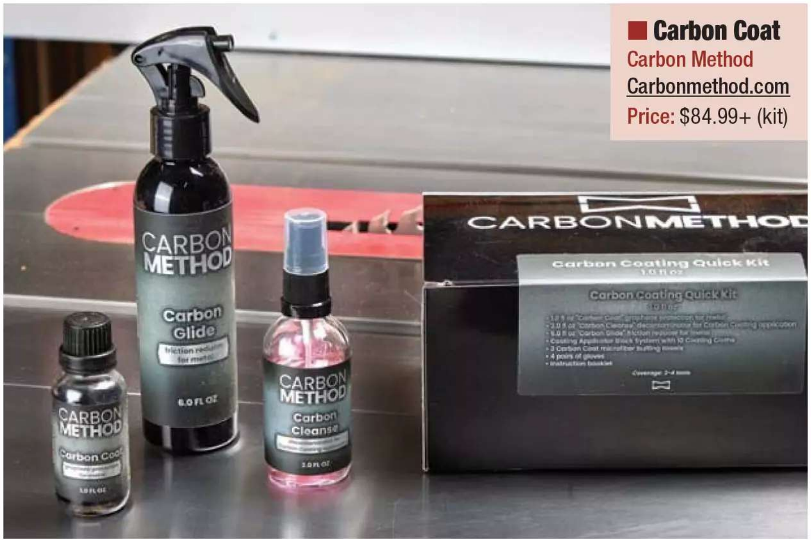
The blade is lined with anodized aluminum scales for the grip. The scales are held on with a pair of binding screws, and it appears that it would be easy enough to swap the handles out with custom ones if you'd prefer (after all, what woodworker doesn't like to customize their tools). The Hacking Knife is supplied bare-bones, but you can add on a case if you'd like. With the heft of this blade and the type of tasks it will see in my shop, I think I would prefer to keep it in a tool rack next to my bench. The rugged design and weight of the blade make it one tool you won't feel bad about abusing in your shop. — *Gregory Kopp*

Carbon Method Carbon Coat

Over the years, I've watched the company *Carbon Method* with interest. Their flagship product is a Ceramic Nanofinish to add additional protection to a finished piece of furniture. Think of it as a ceramic coating on a car. (For what it's worth—I've used it on a few dining tables and liked it.)

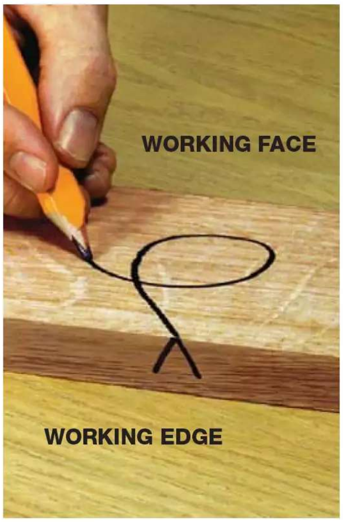
When I met the gentlemen from *Carbon Method* at WIA last October, I picked up their Carbon Coating Quick Kit. This kit is designed to apply a protective layer to your cast iron tools. As a long-time user of paste wax (RIP Johnson's), I figured I would test it by applying it to some of the high-use tools in the shop. Application is straightforward, especially if you've used the *Carbon Method* products in the past. The Carbon Coating kit is a three-step process. You start by cleaning the surface. Then, a graphene coating is applied. This adds rust and scratch protection. Finally, the Carbon Glide is an ultra-low friction top coat that puts a paste-waxed surface to shame.

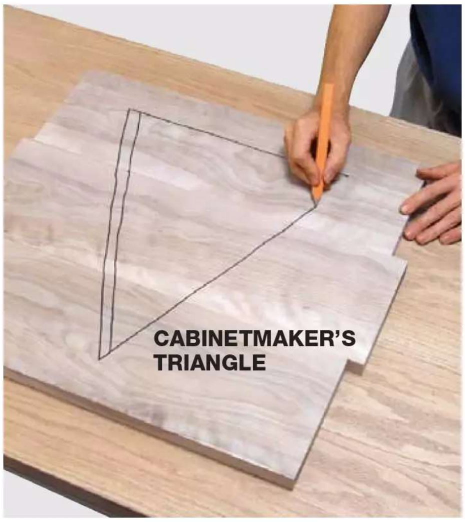
I applied the first coat in October, and now it's 5 months later, and the top looks as good as the day I finished it. The Carbon Glide coat does need to be reapplied every so often. I've noticed recently that mine could probably use another coat. It's easy, though — just spray it on and wipe it off. The Carbon Coat is available as individual components or as the kit, as shown below.— *Collin Knoff*



Carbon Coat
Carbon Method
Carbonmethod.com
Price: $84.99+ (kit)

WORKSHOP TIPS


WORKING FACE
WORKING EDGE


CABINETMAKER'S TRIANGLE

Customary Marks

These furniture maker's symbols are an international language. They have been used for generations because they're easy to make and easy to understand.

A board's working face and edge are the surfaces that all measurements are taken from. This dates back to when boards where planed by hand. You couldn't count on every side to be strictly parallel, so two were designated as reference surfaces. It's still a good idea. These marks can mean front and top, too.

The cabinetmaker's triangle is a straightforward method of marking boards to be joined together. Imagine an old-time shop. The master carefully arranges the boards to make the most pleasing pattern, then scrawls this triangle across the boards and hands them off to an apprentice to glue up. These days, this mark is just a handy reminder of what our intentions were when we laid out the boards last weekend!

Chip-Free Bits

Spiral bits often make smoother, more accurate cuts than straight bits. An up-cut bit pulls chips up and out, making it perfect for cutting mortises in solid wood. A down-cut bit pushes chips downward, ideal for making chip-free dadoes in plywood and melamine. (Down-cut bits are not recommended for use in a router table, however, because they can push the workpiece up off the table). A compression bit has spirals running both ways, up and down, pulling chips toward the middle of the bit. It's the best bit for routing the edges of plywood or melamine—you'll get a chip-free surface on both sides.

PHOTOS PROVIDED BY THE AUTHOR

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NEW TOOLS

Cottrill Paste & Hard Wax

Paste wax is a wonderful thing. You can use it on tools in your shop and apply it to furniture as an extra layer of protection. In fact, wax is one of the oldest finishes known to man. Commercially available waxes are available, but I often find they're packed full of solvents and stink up the house when doing maintenance. The paste wax from Matt Cottrill at *Cottrill Woodworks* has a low odor (it has a lovely citrus scent) and leaves a nice surface.

The *Cottrill* paste wax comes in a tub. Think of a large tub of shoe polish. It's the perfect size to keep in the house to spiff up furniture throughout the year. I've found that the *Cottrill* wax applies easily—wipe on a coat and let it sit. After about 30 minutes, you can come through and buff the surface and remove any excess wax. The best part of Matt's wax is that it offers great water protection. I used it on the top of the desk (later part of this issue). Goose (the feline shop manager) has spilled full water glasses on it, without affecting the shellac.

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Price: $10.00+

Not only does *Cottrill* offer a tub of paste wax, but they also have a stick of hard wax. You can see this on the left in the photo above. This is the perfect thing to keep in your apron pocket and to use on tools during the workday. A few swipes across the sole of a plane or the plate of a saw are all that you need to reduce friction and make your work a little bit easier.
—*Logan Wittmer*

Milwaukee M18 FUEL 5" Random Orbital Sander

Of all of the power tools to leap cordless, sanders are one of the last remaining segments that have not been perfected. Battery-powered sanders tend to be overly heavy and have issues with weight balance. The new *Milwaukee* M18 Fuel sander hasn't quite solved these problems, but it's a very solid entry that punches above its price point.

Milwaukee has aimed for the heart of the market, packing in features like wireless dust control and an edge guard for protecting adjacent surfaces into a sander that costs almost half of what other professional cordless sanders cost. Special attention has been paid to reducing vibration as well. For longer sanding stints, it's still noticeable, but it's definitely the best of all the sanders I've tested so far.

One standout feature is the dust collection. *Milwaukee* claims up to 95% efficiency of dust collection with an extractor attached, and they might be selling themselves short. I used the sander for some carpentry work indoors and found virtually zero dust on surfaces after I was done.

The sander is designed to work specifically with *Milwaukee* dust extractors with VACLINK, creating a seamless connection to activate the dust extractor when the sander is turned on. Look for more info on VACLINK and the new Milwaukee dust extractor in a future issue. — *Collin Knoff*

Milwaukee
FUEL
XC6.0
M18 REDLITHIUM
FORGE

M18 FUEL 5" Random Orbital Sander 2837-20
Milwaukee
MilwaukeeTool.com
Price: $199 (tool, dust bag, edge guard, universal hose adapter)

Connect

WORKSHOP TIPS

PHOTO BY PATRICK HUNTER

Waterproof Outdoor Projects

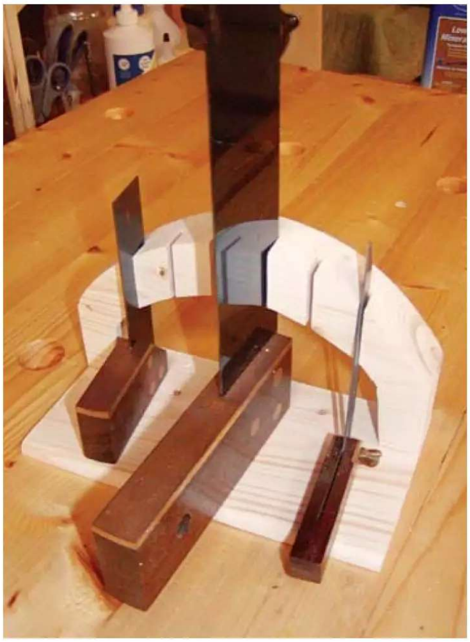
When used as an undercoat or sealer, brushable epoxy greatly reduces expansion and contraction in wood. Coat all parts prior to assembly and make sure epoxy gets down into the fastener holes. If the wood absorbs a lot of the epoxy, sand the first coat after it cures and apply a second coat. Epoxy is not UV-resistant, though, so you must topcoat your project with exterior varnish or paint. The extremely stable epoxy base coat also means that your topcoat will last much longer before refinishing is necessary.

Square Rack

I want my squares close at hand when I work, but I don't like to have them just lying around my bench, when they can get dinged or knocked to the floor. This simple rack made from a 2x4 cutoff keeps them safe and sound.

To make the rack's base, resaw a 1/2" thick strip from the 2x4. Use your tablesaw to cut 1/2" deep kerfs in the remaining piece, then cut this piece on the bandsaw to create an arch. Glue and screw the arch to the base.

–Mark Thiel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SUPERIOR STRENGTH
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NEW TOOLS

Versa-Fence Upgrade

I think it's a safe bet that the table saw is at the heart of most shops. Today, Sawstop saws are the most popular due to their safety features. And they are indeed a great saw. The one item I always thought could use a little attention was the fence supplied on the saw. The stock fence has a little bit of wave and puckering where the bolts attach it to the steel core. Woodpecker's new Versa-Fence upgrade for Sawstops offers a low-friction, dead-flat add-on to your table saw fence.

The Versa-Fence is offered in several different lengths, ranging from 36" to 48", and is made of a 7/8"-thick piece of extruded aluminum. The aluminum is anodized, and that coating includes PTFE (the brand name Teflon), so your workpieces glide along it easily. One of the things that drew me to this fence is that it offers a bit longer work support than the standard fence. In addition, being extruded, it has a track on the top and bottom of the fence. This means you can add accessories like roller guides. The 48" versions come with a support platform that can be mounted on the infeed or outfeed side of the fence for additional support as you make your cut. The Versa-Fence installs in a few minutes with simple hardware and is a great upgrade to your saw. — *Bob Reynolds*

Woodpeckers' VERSA-FENCE FACE UPGRADE

VERSA-FENCE
Woodpeckers
Woodpeck.com
Price: $159.00+

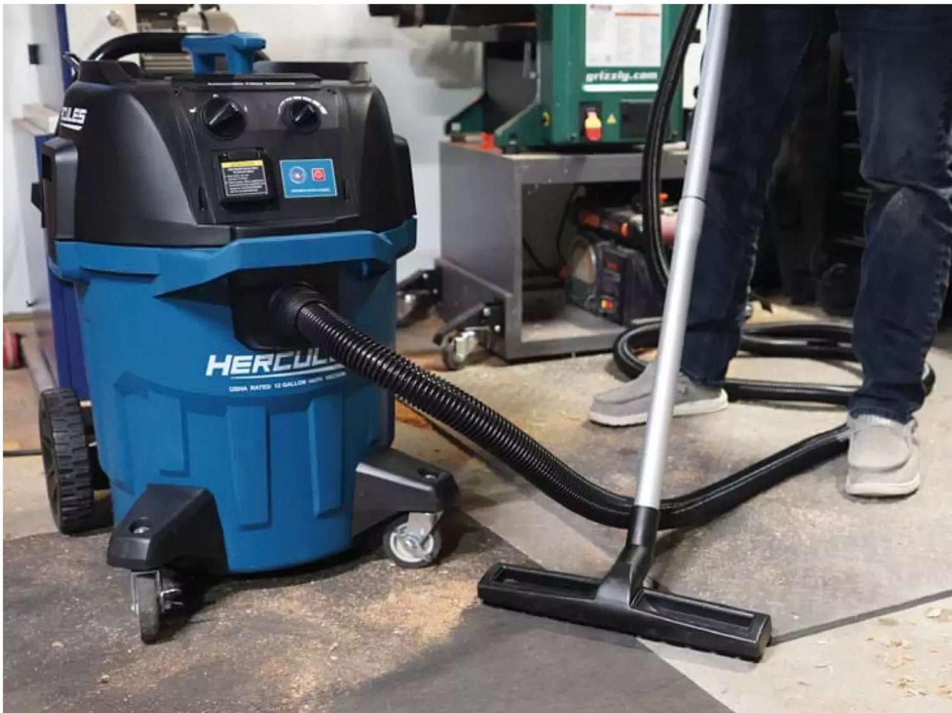
Hercules OSHA-Compliant Dust Extractor

I continue to be impressed with the leaps and bounds that *Harbor Freight* has made in the power tool marketplace. The new 12-gallon OSHA-Compliant dust extractor from their Hercules brand is a great example. If it had been part of our dust extractor competition in the October 2023 issue, it would have been best in class for hose length, capacity, and included accessories. It also would have been the cheapest OSHA-compliant extractor there by $200.

It's not just a numbers game, either. The form factor of the extractor itself is great, with a telescoping handle and large wheels in the back that make it easy to move. The tool-activated outlet works exactly as it should, and it even has an automatic cleaning feature. Plus, the onboard storage is thoughtfully done.

So, you may wonder what are you missing out on regarding those price savings? Not much, to be honest. Though long, the hose feels a bit cheap (it is still anti-static.) There's also the warranty: 90 days vs up to 3 years from some other brands. It might be a gamble to forgo the extra coverage, but at this price with these features, it's one I'm willing to make. — *Collin Knoff*

12 Gallon OSHA-Compliant Dust Extractor
Hercules
Harborfreight.com
Price: $349.99



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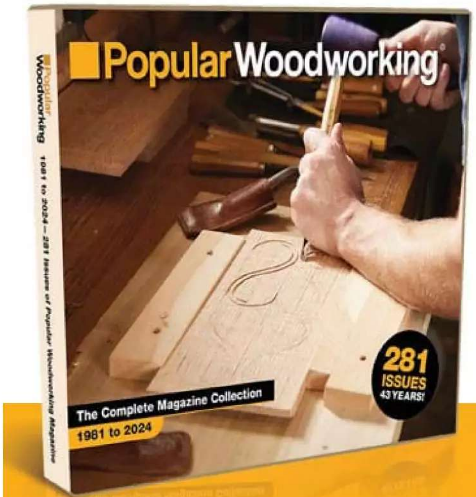
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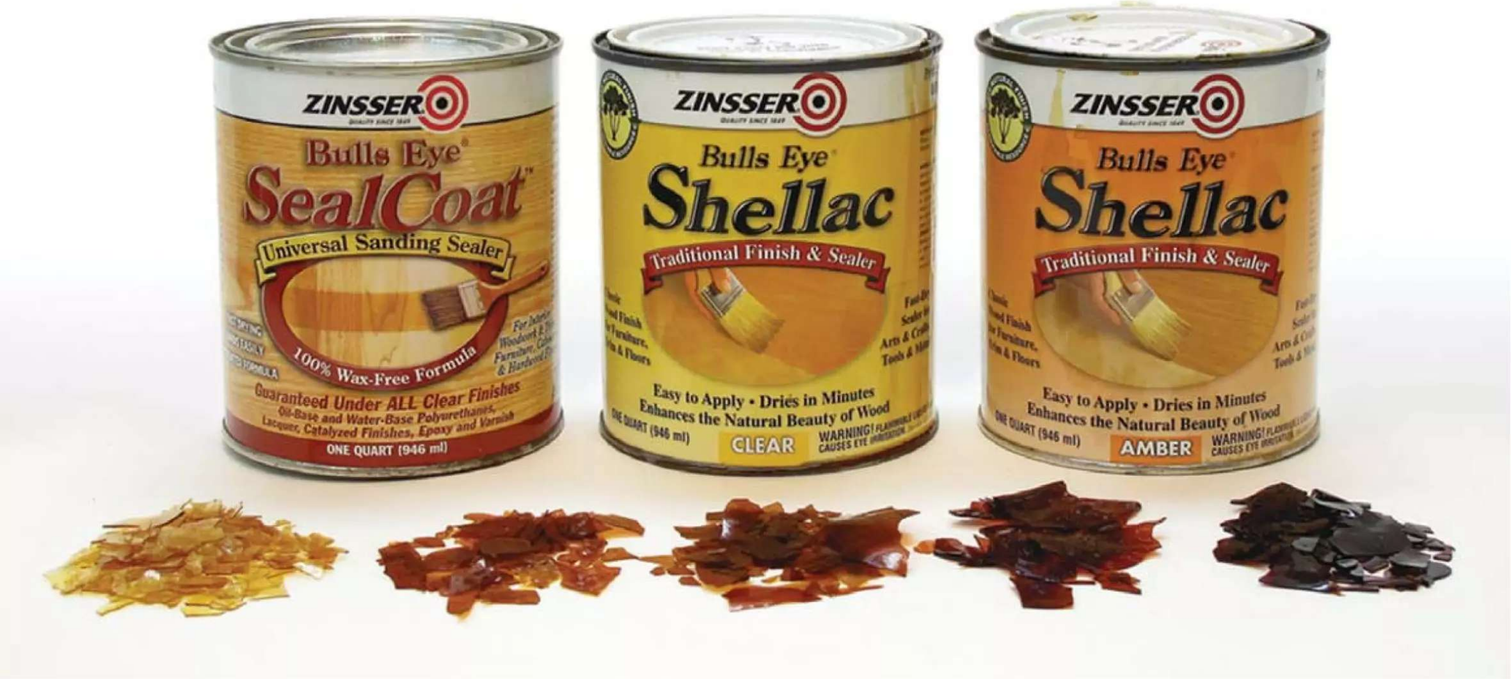
Finishing Room

Shellac: A Challenging Finish

This traditional finish can be tricky to apply.

By Bob Flexner & Logan Wittmer



There are a lot of shellacs from which to choose. In liquid form there is (from left) clear shellac with the wax removed, clear with wax, and amber with wax. In flake form you can choose shellac (from left) superblonde, lemon yellow, orange, garnet, and extra dark.

If you have read much in the woodworking press, you've surely encountered many articles, including mine, in which the writer uses and recommends shellac as a finish. This may persuade you to try shellac.

I certainly don't want to discourage you because shellac is a great finish with a great history. But you need to be aware that shellac is a relatively difficult finish to use. The writers recommending shellac are usually advanced woodworkers who have learned to overcome the difficulties. By pointing out some of the problems, I hope to increase your likelihood of success.

Before you even get started, you have to overcome the confusion of shellac names and the large variety of shellacs available in flake form.

Bob Flexner's Contributions

The staff at Popular Woodworking received the news of Bob Flexner's passing in December 2024 with heavy hearts. Bob was renowned for his expertise in wood finishing, and his contributions have significantly transformed our approach to woodworking. His landmark book, "Understanding Wood Finishing", has sold over 750,000 copies and been translated into multiple languages, effectively debunking many myths perpetuated by the finishing industry. Remarkably, it remains the only woodworking book to ever reach the Amazon top 1,000 list. Bob Flexner's legacy in the craft and the woodworking community will be remembered for many years to come.

PHOTOS BY LOGAN WITTMER

In liquid form, there are clear (actually pale yellow) and amber shellacs. Until about 20 years ago, when the sole remaining supplier, *Zinsser,* changed the names for marketing purposes, these were labeled white and orange. *Who wants orange furniture?* was the explanation.

In solid flake form, which you dissolve yourself in denatured alcohol, the names include: blonde, superblonde, lemon yellow, orange, garnet, button, ruby, extra dark, and more. These names all refer to the color, ranging from pale yellow to very dark orange.

Where to Start?...

Usually clear or blonde on light woods and anything on dark or dark-stained woods. Whichever you choose, it's not as simple as buying a can of polyurethane at a home center.

Wax or No Wax

There's also the issue of wax. Shellac is a natural resin secreted from insects that feed off of plum trees in South Asia. This resin naturally contains 4 or 5 percent wax.

The wax can inhibit bonding with other finishes, so Zinsser introduced a dewaxed shellac called "SealCoat" and markets it as a sealer for polyurethane—even though polyurethane, like all finishes, seals perfectly well on its own. (As I've written many times, the need to use shellac as a sealer is way overblown except for some refinishing situations.)

Clear and amber liquid shellacs still contain wax. Most varieties of flake shellac have the wax removed. There's no noticeable difference when you use the shellac for the entire finish.

Pound Cut

Unlike other finishes, in which all brands within a category have similar solids content (the ratio of the finish that hardens to the total liquid, including solvent), liquid shellac can vary from almost no solids to very high solids depending on the ratio of shellac flakes dissolved. The system used to measure the relative solids content is called "pound cut," which is the ratio of the number of pounds of shellac flakes dissolved in one gallon of alcohol.

Clear and amber liquid shellacs are 3-pound cut (too thick of brushing without brush marks, so you need to add thinner). SealCoat is a 2-pound cut (at the upper limit for easy brushing). When you dissolve your own shellac flakes, you determine the pound cut.

You don't have to deal with these variations using any other finish.

No Satin

Shellac is the only film-building finish not available in the sheens ranging from gloss to flat. All shellacs are high gloss.

If you want a satin sheen, you have to rub the shellac with fine steel wool or other abrasive. This is more work, and it creates fine scratches that make the surface very fragile. Any slight abrasion, even a light pass with the back of your fingernail, will level the ridges between the scratches and leave a mark.

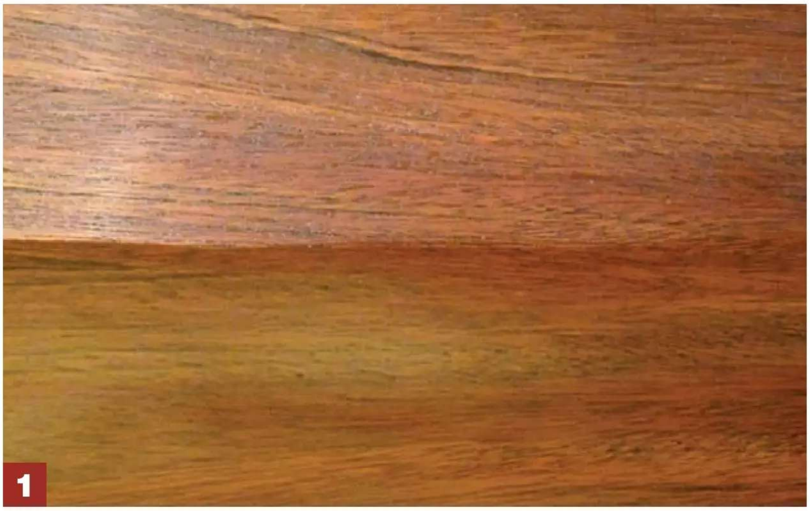
To reduce marking, you can apply wax or a silicone furniture polish. Both raise the shine back to a soft gloss, but applying paste wax is a lot of work.

Blushing

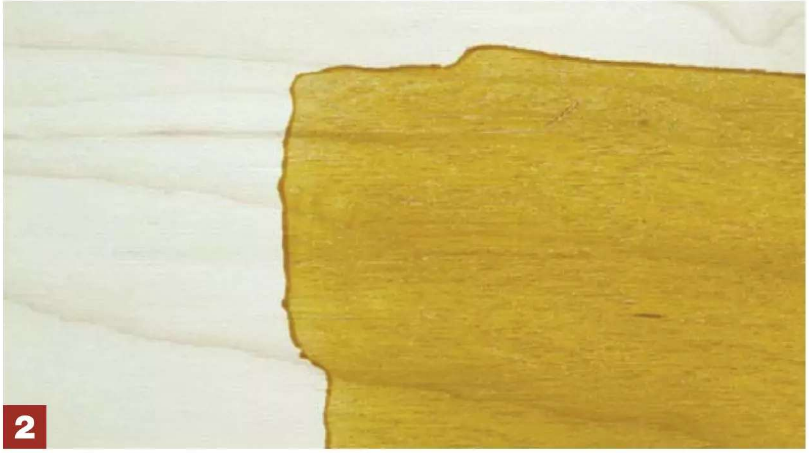
Just like lacquer, shellac blushes (turns milky white) in warm, humid conditions. Unlike lacquer, there aren't widely available solvents for handling this problem.

With lacquer, you can add lacquer retarder to eliminate the blushing (though this slows the drying.) You can add lacquer retarder to shellac also, and this is the best solution for the problem (other than waiting for a drier day). But try it on scrap wood first because lacquer retarders are formulated differently and the shellac may not dry properly.

Finishes other than shellac and lacquers don't blush.



1 Like lacquer, shellac blushes in humid conditions. You can see the blushing developing in the lower half of this panel that I just brushed. Sometime the blushing disappears on its own. Otherwise, wait for a drier day or add lacquer retarder to the shellac.


2

2 Unlike other finishes, shellac tends to ridge at the edges of brush strokes, as shown here on soft maple. This is the color produced by one brush stroke of 2-pound-cut garnet shellac.

Ridging

Unlike other finishes, shellac tends to ridge at the edges of brush strokes. The way to reduce the ridging is to add more thinner, but then you have to apply more coats to get the same film thickness.

Shelf Life

The biggest problem with shellac is probably shelf life. Shellac is unique in that it deteriorates — especially in liquid form, but also in flake form.

In flake form shellac usually stays good for many years unless it is stored in hot conditions or has been bleached to create a "blonde" color. When the flakes go bad, they usually (but not always) "block" into a solid lump, and they no longer dissolve well in alcohol.

In liquid form, the deterioration begins immediately upon dissolving. If the shellac is stored in cool conditions, you won't notice any difference for six months or so. But in time, you'll notice that the shellac dries more slowly, takes much longer to harden, and becomes susceptible to watermarking (freshly dissolved shellac doesn't watermark except in contact with very hot water).

Zinsser used to stamp the date of "dissolving" on their cans, which was helpful in letting you know the age of the shellac. Now the company just stamps a lot number, which is of no help.

Short shelf life is the reason advanced woodworkers usually dissolve their own shellac from flakes. Freshly dissolved shellac always performs better.

Dissolving Your Own

Even dissolving your own shellac can be problematic. It's extra work, of course, and you have to plan in advance so the shellac is ready when you are. You also have to weigh the flakes and figure out the proportions to get the pound cut you want.

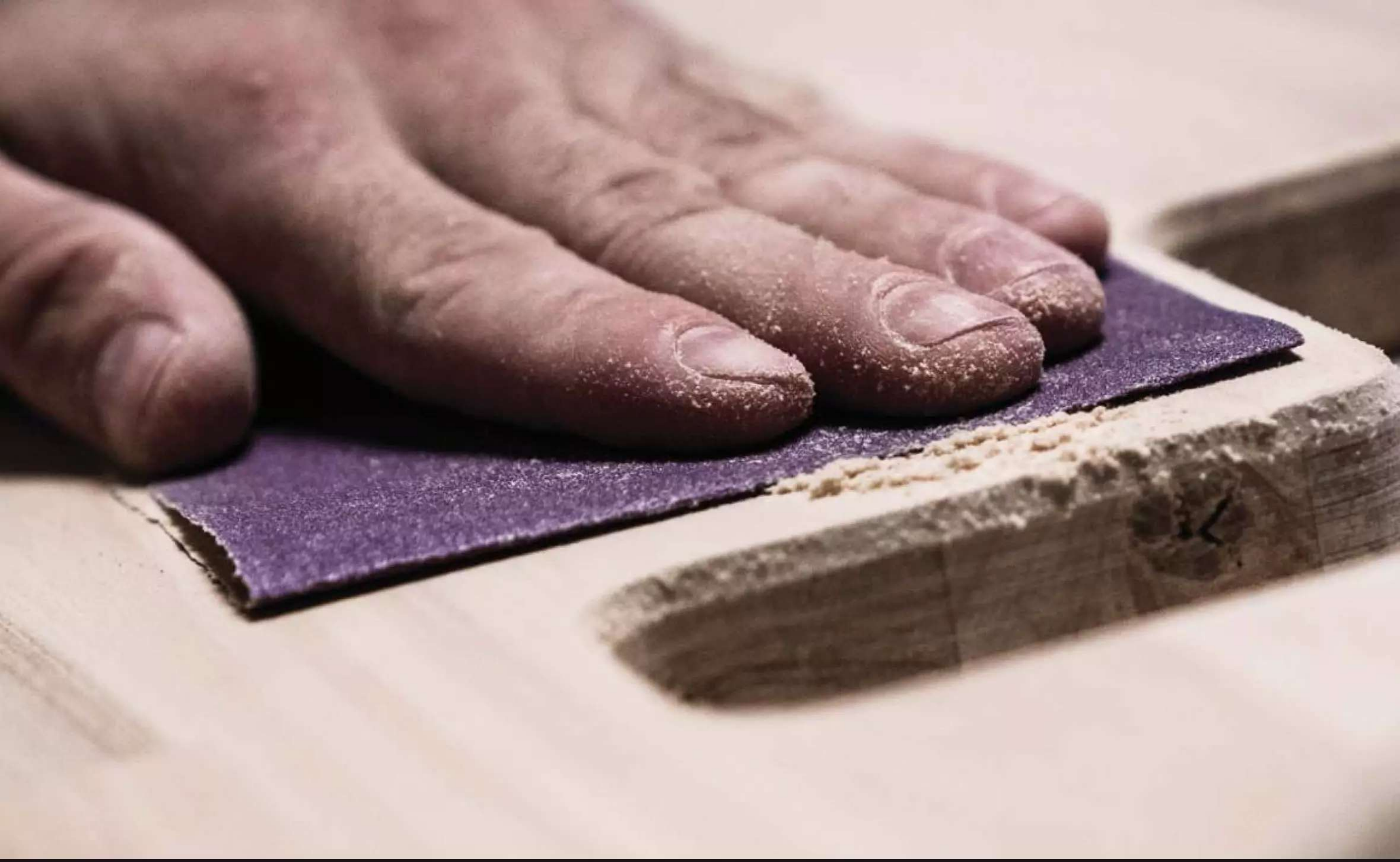
You should stir the dissolving flakes often. Merely shaking the container now and then will result in a hard lump of gummy shellac at the bottom that will be difficult to stir in. No matter how you cut it, shellac is a relatively difficult finish. **PW** - *Bob Flexner*

3 A good indicator, especially with bleached flake shellac, that the shellac won't dissolve is "blocking" — the flakes and powder lump into a solid. You can try it, but this shellac is probably no good.

3

4

4 If flakes won't dissolve after a day or two, the shellac is no good and should be thrown out. Shellac is somewhat unpredictable because it is a natural material. The orange flakes I tried to dissolve here look perfectly good; they weren't "blocked." But they still wouldn't dissolve.



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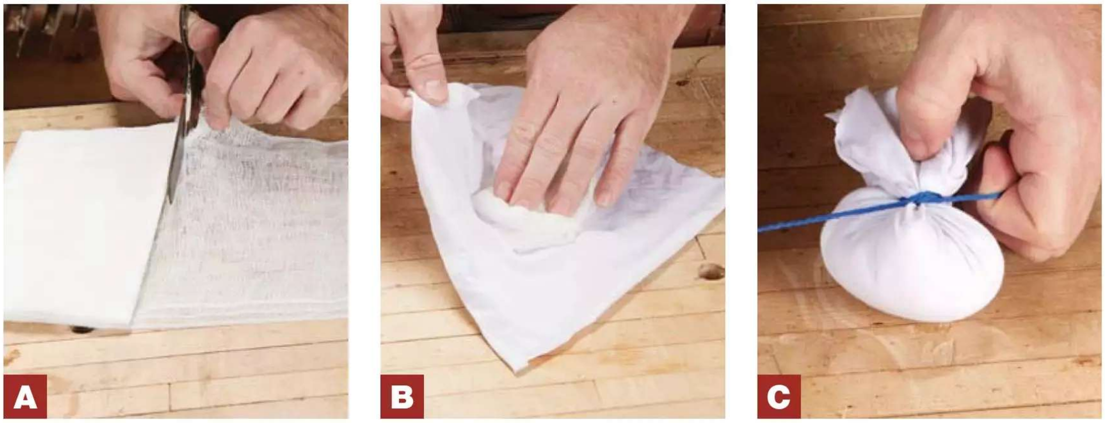
Making a Shellac Pad



Because shellac Because shellac uses denatured alcohol as the solvent, close attention must be paid to the application tool. Foam brushes can dissolve as you apply the finish. A high-quality brush is a good bet, but my favorite is a shellac pad. You can see the steps to create a shellac pad above.

A shellac pad is simply a folded-up section of cheesecloth wrapped in a lint-free shell. I start by cutting a section of cheesecloth about two feet long. The cloth gets folded into a small square, and tucked inside of a lint-free cloth. I prefer a piece of 100% cotton cloth cut from an old T-shirt. Then, I twist the corners together and tie it with string. You're left with a tight little pouch containing the cheesecloth.

Using the pad is straightforward. The pad is dipped into a can of thinned (1-1.5lb cut) shellac. The cheesecloth will soak up and store the finish. As you glide the pad across your surface, the amount of shellac applied depends on how hard you squeeze (or push on) the pouch. After you're done, the pad can be stored in an airtight container with denatured alcohol for future use.

PW - *Logan Wittmer*

A-C The inside of the shellac pad is made of a folded piece of cheese-cloth. Cut a section and fold it into a square. If the folded square feels small, cut more and wrap it around the first ball. Tuck the folded cheese-cloth into a section of 100% cotton rag and tie it tight.

D The shellac soaked pad deposits a thin, even layer of finish.

E After using the pad, put it in a glass jar with a lid. Top it with denatured alcohol to store the pad for future use.

D
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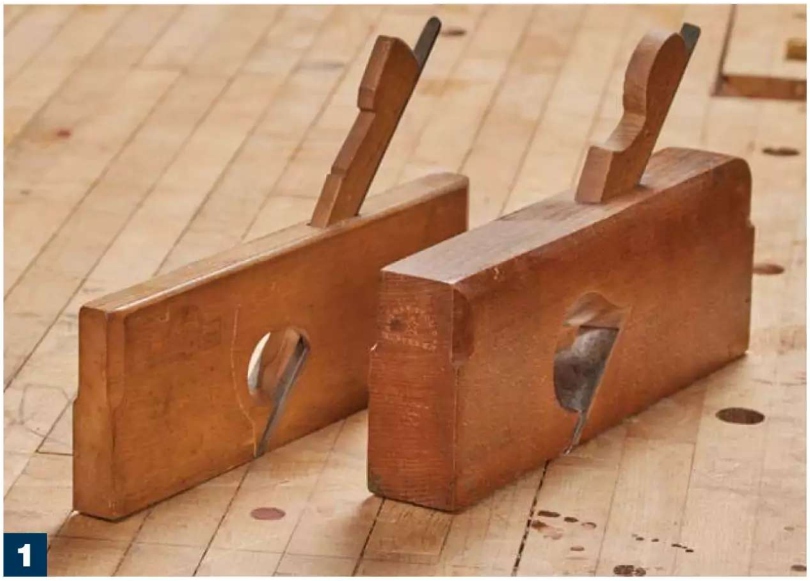
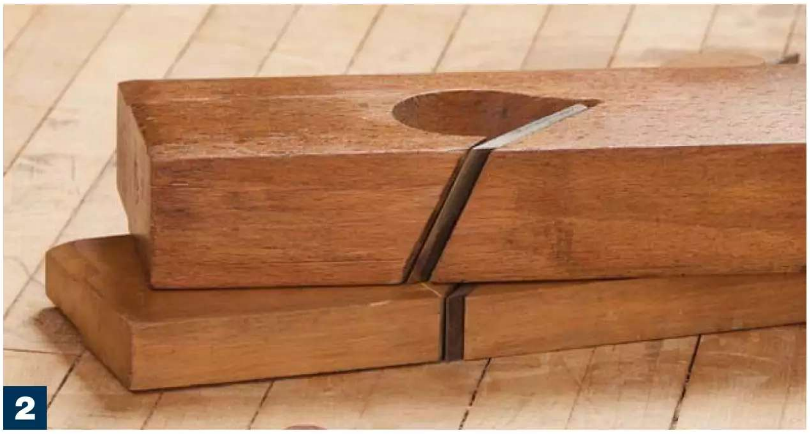
Rabbeting by Hand

Cutting rabbets by hand can quickly and easily be done with vintage and modern planes alike. Both just take a little know-how.

By Logan Wittmer

1-2 A pair of wooden planes look similar, but the one on the left is technically a shoulder plane, and the one on the right is a rabbet plane. The rabbet plane has a skewed blade, more open mouth, and a large opening for shavings to eject during use.





PHOTOS BY LOGAN WITTMER

I would consider a rabbet joint an essential woodworking joint to know how to cut. It's as equally valuable building the case of a chest as it is building down and dirty drawers. In the modern shop, many craftsmen will load up a dado blade in the table saw or a rabbeting bit at the router table. However, cutting a rabbet is easily done with some simple hand tools. Of course, there are many ways to skin a cat—a back saw and chisels, a router plane, amongst others—here, we're going to concentrate on rabbet planes and using them to create accurate rabbets.

Rabbet Planes of Old

Take a stroll through any antique store worth its weight in gold, and you're bound to come across someone selling a variety of molding planes. Often, you'll find rabbet (shoulder) planes such as Photo 1 mixed into the bunch. And, it makes sense. Often, rabbets are used in conjunction with molding planes to create a variety of profiled moldings. But you really have to know what you're looking at to avoid picking up the wrong plane and getting confused. The two planes in Photo 1 look the same (except the width), but one is a shoulder plane, and the other is a rabbet plane. The difference has to do with the blade angle and the escapement for the shaving.

A shoulder plane is designed to help refine shoulders on joinery, specifically end-grain. This means that they'll often have tight mouths, and the blade will be bedded at a lower angle than a rabbet plane. These are not for removing a mass amount of wood at once. That's not to say you can't cut a rabbet with one—but what you will find is that the mouth clogs up pretty quickly as you start working.

A rabbet plane, on the other hand, is designed to get that wood up and out of the way. Most of the time, you'll see that the blades are skewed on rabbet planes. This allows the shaving to come out at an angle and spiral out of the escapement. You'll see some of these shavings in the next few pages. The escapement is also opened—the left side (assuming it's a right-hand plane) will be larger than the right-hand side. The skewed blade picks up the shaving and throws it through the large opening in a spiral fashion.

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GRAND PRIZE

JET Black 8" Helical-Head Jointer (JT1-1373 JWJ-8HH-BLK)
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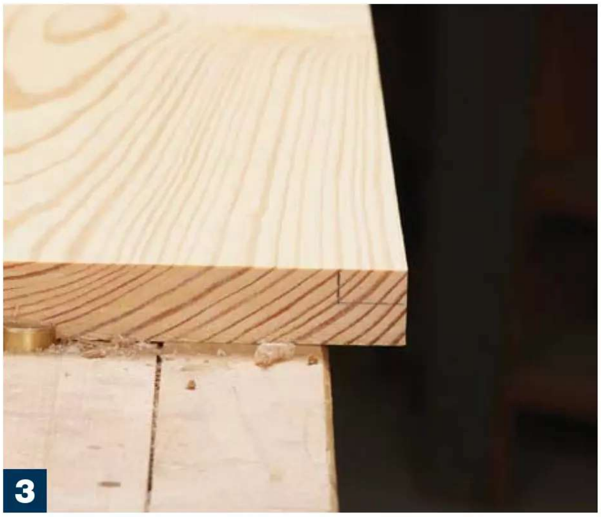

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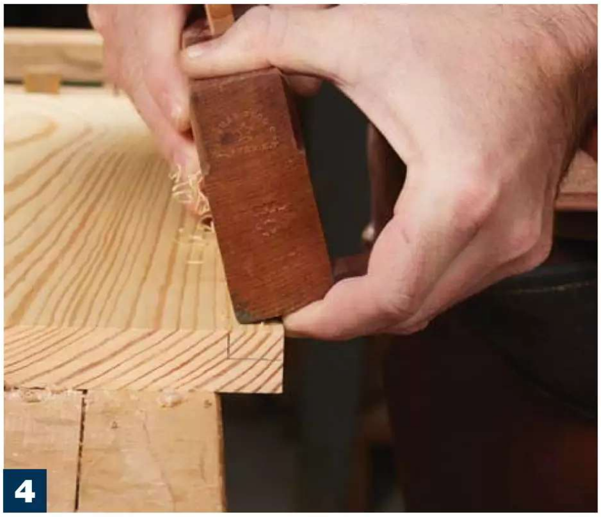

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3 A pair of lay out lines show you where your rabbet is going to be cut and help guide your progress.

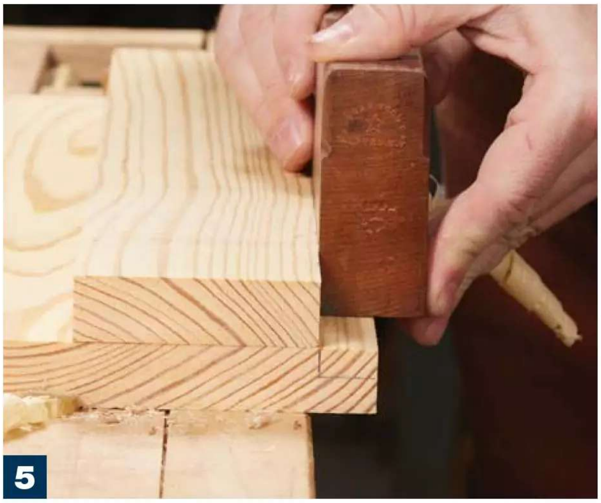
4 Tilting the plane allows you to use the corner to create a small shoulder that will guide the plane.

5 My preferred method is to clamp a fence in place and use this to guide my rabbet plane.

When looking at rabbet planes "in the wild," pay attention to the corners and the mouth. A fairly open mouth is OK, but I look for a body in good shape. Also, make sure the wedge is tight (you can make a new one, however, if needed) and that the blade isn't pitted.

Wood to Wood

So, first things first. With a wood body plane, I like to lay out my rabbet on both ends of the workpiece. This gives me a visual gauge of the location, depth, and squareness of the cut.



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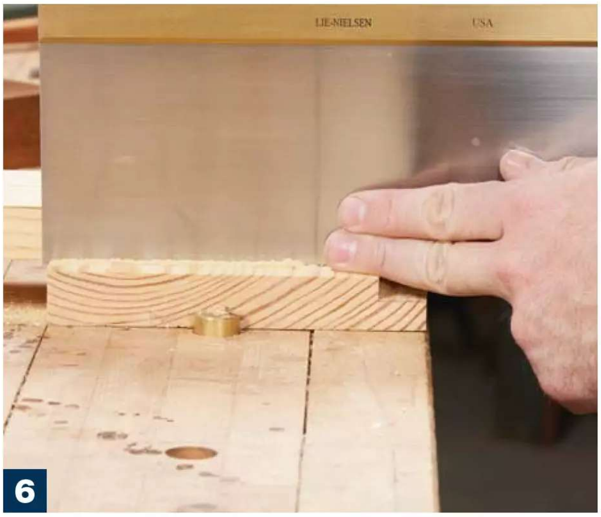
A lot of wood rabbet planes won't have a fence, but you may occasionally find ones where an owner screwed or nailed one on. You'll need a way to guide the plane if they don't. The most simple is to hold your fingers on the bottom of the plane and use them as a gauge to position the sole. You can see this in photo 4 above. If I'm doing this, I'll start with the plane leaned over heavily and create a small groove with the corner of the blade first—this gives me some form of guide to help line up the plane as I'm working. Then, you'll rock the plane back to square and cut down to your line. This method is certainly the fastest, but I find it can be somewhat inconsistent. Instead, I like to use a wood fence to guide my plane.

As you can see in Photo 5, I've attached a wooden fence to my workpiece. Here, it's held down with double-sided tape, but holdfasts work well also. There shouldn't be much pressure against the fence as you cut; it's just there to guide the plane. Notice the spiral shaving coming out of the plane—that's the difference between a shoulder plane and a rabbet plane. With a rabbet plane like this, I try and make full-length passes instead of short little strokes at the beginning (like you would with a plow plane). This keeps the depth consistent as I work.

I'll slow down and gauge my progress as I get closer to the final depth. This is where the layout lines really come into play. I'll sneak up on the line on both ends and make a measurement in the middle to make sure it's the same depth all the way across.

With a wood rabbet plane such as these, long-grain rabbets are easy. Cutting cross-grain rabbets can be trickier if your plane doesn't have a nicking blade (more on that in a bit). Here, I'll use a back saw to cut a shoulder before I plane.

Using the same style of fence, I'll saw down to the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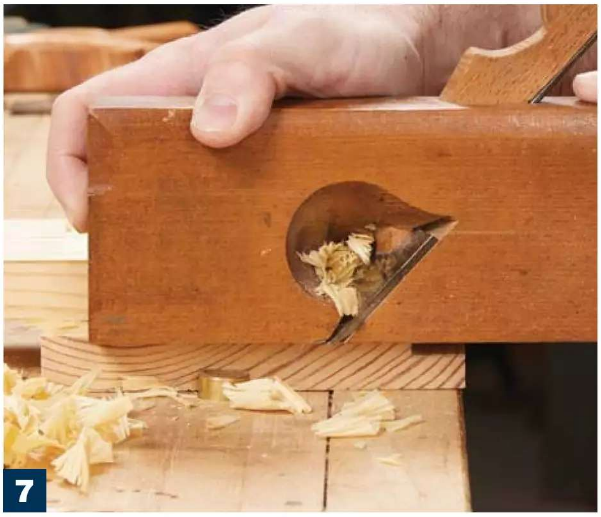

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6 A back saw with a tall plate (such as a tenon saw) is a good way to sever the endgrain fibers if your plane does not have a nicking blade.

7 Cutting across the grain doesn't produce long curly shavings. Instead, they come out in clumps due to the short grain structure.

final depth along the fence. This keeps the fibers from lifting along the shoulder. Now, the plane can be run across the grain to remove the waste. You'll notice that the shavings here are different—they come out in sections instead of ribbons. This is because of the short grain fibers as you cut across the grain.

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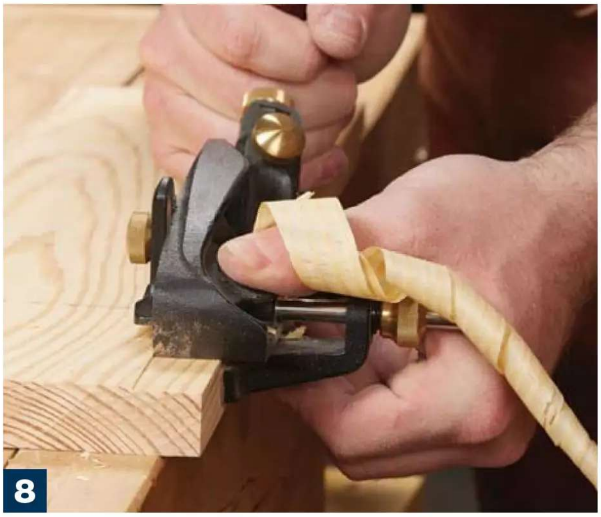
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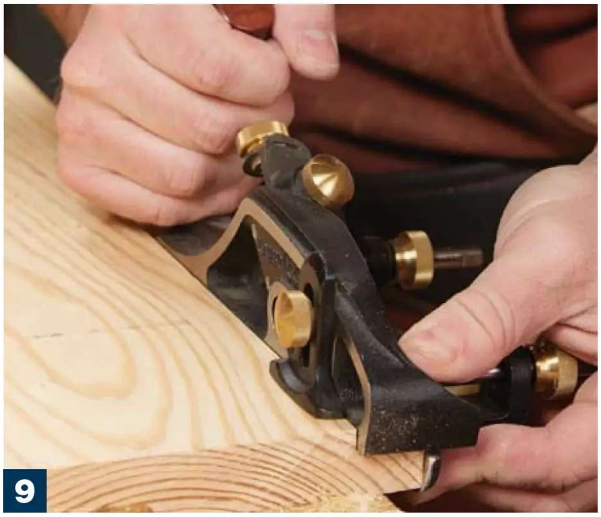
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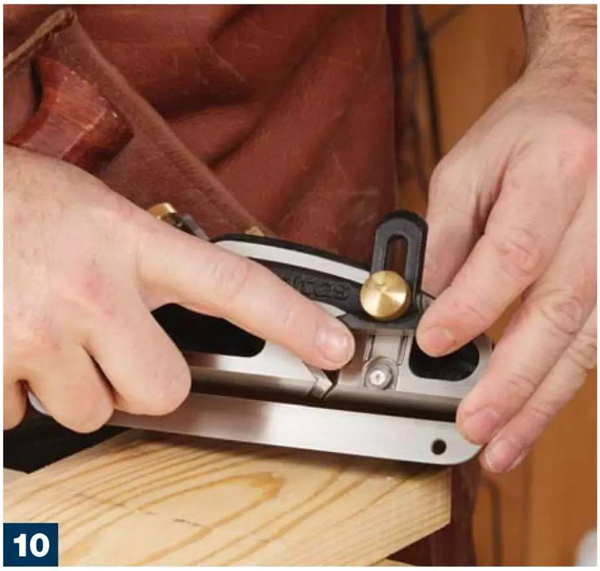
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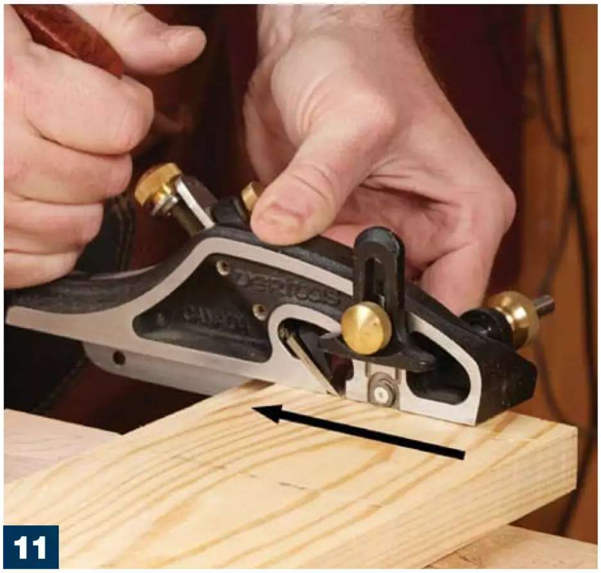
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8 The Veritas rabbet plane has a fence that sits under the sole to set the width of your rabbet.

9 A depth stop sets the final depth. Set this based on the blade location, not the sole.

10-11 The round nicking blade is used to pre-score cross-grain fibers. Drag the plane backwards to score first before cutting.

Modern Metal Rabbets

If vintage planes aren't your style, Veritas offers a modern rabbet plane, as seen above (there are others, but this just happens to be the one I have). In use, they're very similar to their wood counterparts but with some features that make them a bit easier to use. First, they have a modern blade adjuster, so you don't have to fidget with a plane-adjusting hammer. Next, most metal body planes will have a fence that sets the width of the rabbet (some vintage wood planes also have them—these are referred to as fillister planes). You can see this in photo 8 above. (I removed the front knob off my rabbet plane, as I like to have a lower grip, keeping my fingers against the fence). Now, to set the depth, there's a depth stop. In photo 9, you can see that it is engaged, keeping the plane from cutting any deeper.

Finally, most metal rabbet planes will have a nicking blade, as you see in photo 10. This is so to sever the fibers as you work across the grain. By dragging the plane backward (photo 11), you pre-score the fibers to avoid tearing out. If you have never used a rabbet plane to cut a rabbet, you owe it to yourself to grab one and try it. You may find that it's your new favorite way to create this simple joint. **PW**—*Logan Wittmer*

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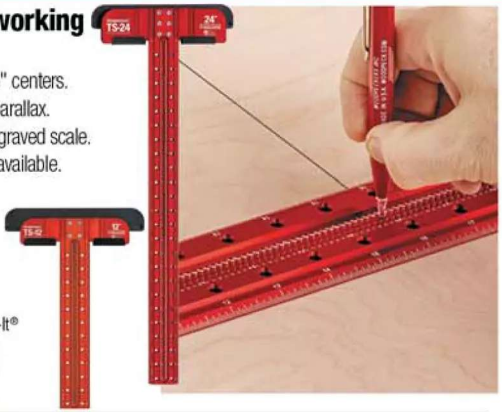

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Moxon Vise

On most workbenches, you have various options to hold your material. Where most benches fail is holding stock, particularly wide stock, for work on the end of the board, such as when you're cutting dovetails. This Moxon vise (named for the English author Joseph Moxon, who first illustrated it in a book) is designed to do just that. The pair of hand wheels move the front chop to pinch boards in place during work. It's a great aid to have in any shop.

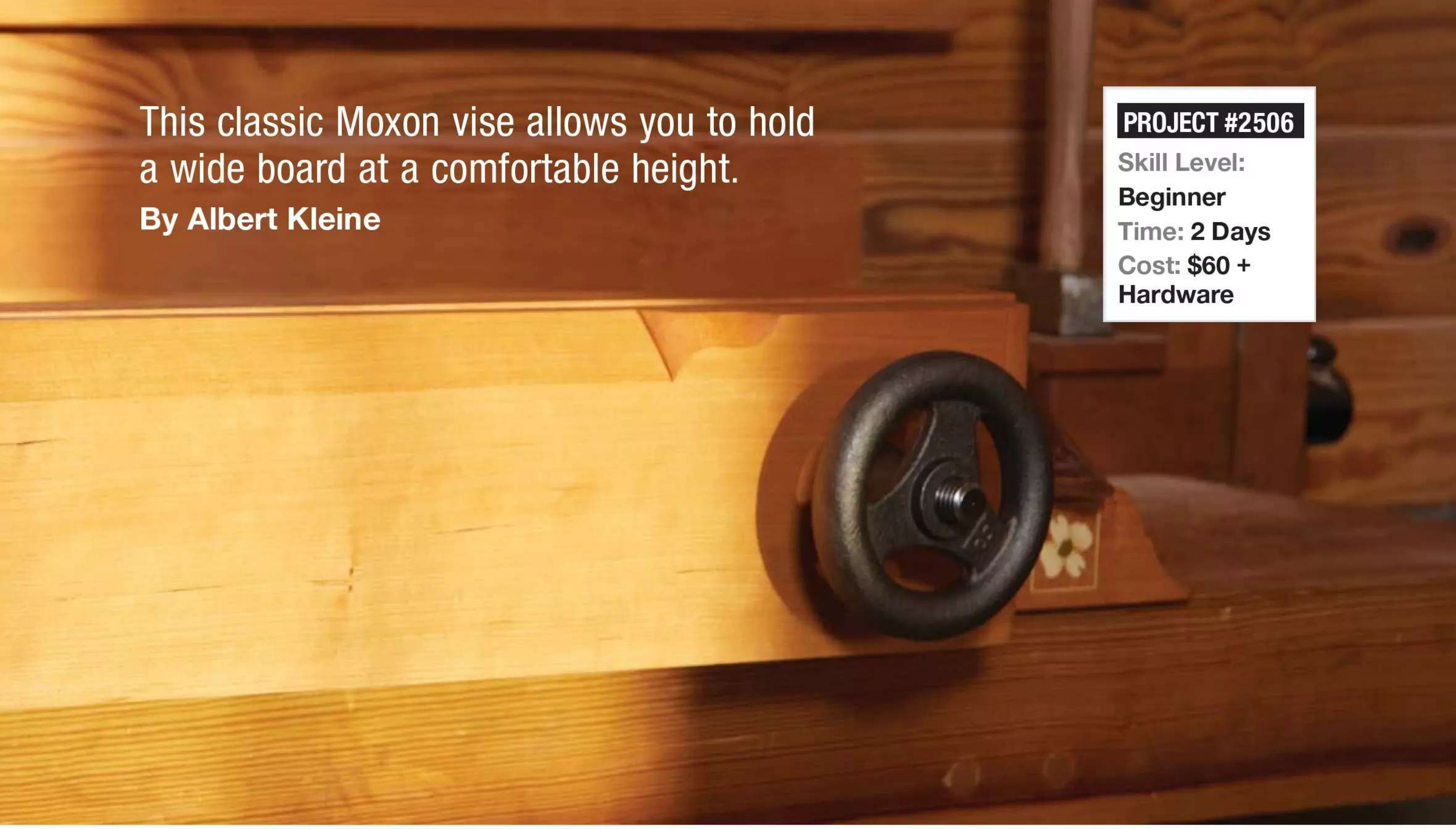
When you look at the vise above, you'll notice that there are few parts. Starting at the rear of the vise, you'll find two parts here—a narrow batten and a rear jaw. Ultimately, the batten and rear jaw will be edge glued together. If you are concerned about grain continuity and color match, mill a ~9" wide, 48" long board to 1 3/4" and rip off material for the batten and rear jaw. Crosscut the rear jaw to the final length by removing an equal amount of materials from both ends. This will ensure an invisible glue line when you join the batten and rear jaw.

Now, moving to the front, the front jaw is made up of one big slab of wood with a pair of holes for the screws. Mark up this location of screw holes in the front jaw. On both sides of the jaw, make a mark 4 7/8 " from each edge and centered along the width. On the front face of the jaw, strike a line 7/16" to the left and right of each mark. These will form the extremes of the elongated holes for the front jaw, allowing it to be skewed slightly, preventing binding during use.

Now, the front jaw (and rear jaw, for that matter) don't need to be fancy. However, adding a few details to each makes them more attractive. Looking at the diagram on page 32, mark the location of the fillet/end ogees, lamb tongues, and stopped chamfer on the front jaw. Make sure you spend a good amount of time making clear marks on all necessary faces of the jaw—the chamfer and lamb tongue should be clearly marked on the front face and top edge, and the end ogee should be marked on both the top and bottom edge. While you are at it, mark the location of the ogees and fillet on the ends of the rear batten, again making sure to mark up both sides. Clear markings will greatly assist in finally shaping and give you proper guidelines to work from, so don't skip this step! Before any shaping can be done, start by chucking a 1" Forstner bit into a drill press. Now, drill a hole 1" deep in the marks you made on the inside of the front jaw. These countersunk holes will provide clearance for a pair of screw springs when the vise is fully closed. These help to force the jaws open so you're not constantly pulling on the front jaw to put a board in place.

Replace the 1" Forstner bit with a 3/4" bit. Flip the front jaw over and concentrate on the holes from the front. When drilling the elongated holes in the front jaw, you want to make sure they are about 7/8" wide (which is why you made the marks 7/16" off-center in step two) but exactly 3/4" tall.

To do this, make sure your Forstner bit is exactly aligned with the center mark for the hole along with the width of the jaw, but with the cutter just touching one



This classic Moxon vise allows you to hold a wide board at a comfortable height.

By Albert Kleine

PROJECT #2506
Skill Level: **Beginner**
Time: **2 Days**
Cost: **$60 + Hardware**

of the extreme lines you drew in step two. After you have aligned everything, firmly clamp the front jaw to the drill press table and drill 3/4" deep (or until it meets the hole you drilled from the back). Shift the jaw over laterally while keeping the bit centered along the width, clamp it down, and drill the remaining “web” of the elongated hole. As long as everything is clamped down tightly and your Forstner bit is sharp, you shouldn’t have any issues.

At the end of the process, you should have two elongated holes on the face of the front jaw and two countersunk 1" holes on the back. Since the elongated hole is just smaller than the countersunk hole, it provides just enough of a

1

MOXON FRONT JAW
MOXON BATTEN

2

MOXON FRONT JAW
MOXON BATTEN

1 A handful of hardboard patterns help mark the detail shapes consistently between faces.

2 Carefully lay out all of the guidelines on the front jaw.

3 Start by defining 1 hole in the front jaw.

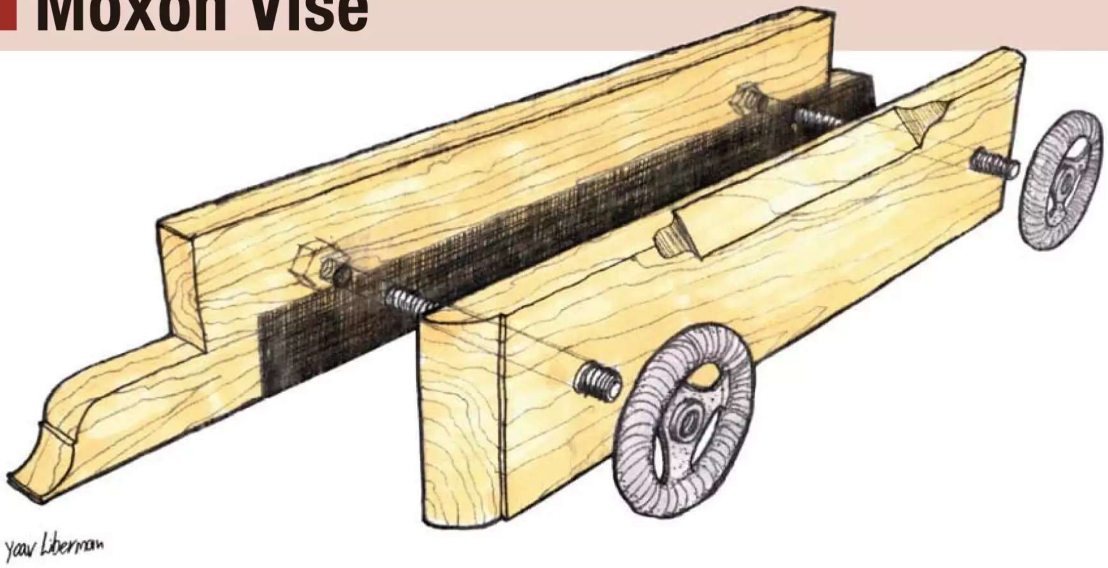
4 Shift the workpiece over so that the second hole creates an elongated slot.

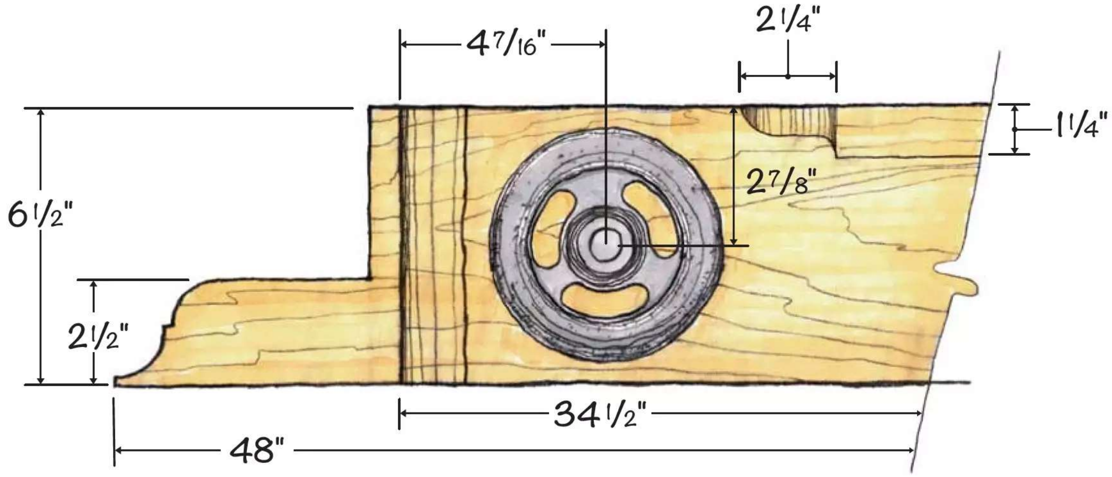
3

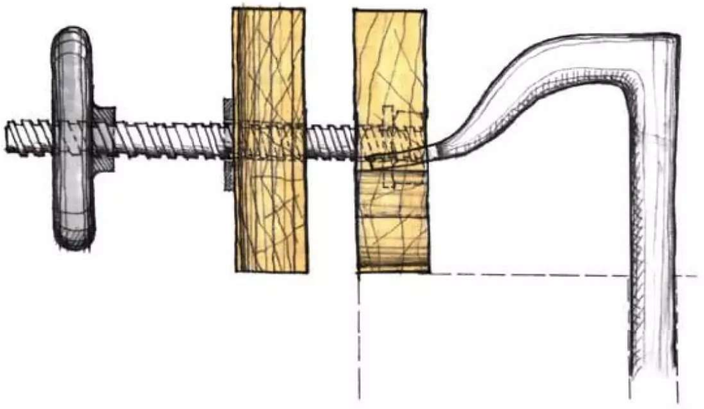
4

PHOTOS BY LOGAN WITTMER

Moxon Vise


Yoav Liberman


4 7/16"
2 1/4"
1 1/4"
2 7/8"
6 1/2"
2 1/2"
34 1/2"
48"



Cutlist

No.	Items	Dimensions (in.)		
		T	W	L
1	**A** Front jaw	1 3/4	6 1/2	34 1/2
1	**B** Batten	1 3/4	2 1/2	48
1	**C** Rear jaw	1 3/4	3 7/8	36

ILLUSTRATIONS BY YOAV LIBERMAN

ledge to keep the screw springs in place.

Detail Work

Now, we can shift focus to cutting some of the extravagant details on the vise. Use a backsaw to define a kerf cut at the end of each lamb's tongue, between the chamfer and the lamb's tongue. Make sure you don't go beyond the marks on the top and front of the jaw.

Mark the extremes of the stopped chamfer on one each of the jaws for setup purposes. Over at the table saw, position the jaw on a crosscut sled or miter gauge and raise the blade/adjust the sled until the blade is just shy of both extremes (photo 6). Depending on the size of the blade in your saw, it may not be possible to line this up perfectly—that's fine; just try to set things up so you will be removing as much material as possible.

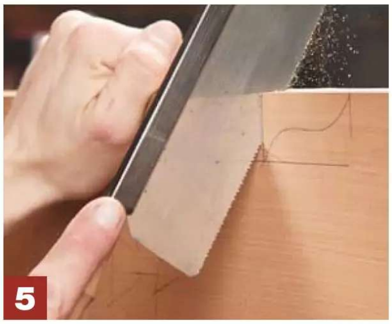
After you've determined the sled's optimal location and blade height, clamp a stop inside your miter slot to ensure you don't push your sled too far.

Start removing material for the stopped chamfer by slightly engaging the table saw blade into the front jaw's waste section and sliding from left to right. The kerf cuts you made earlier will provide you with nice visual stopping points at both extremes.

As you do this, make sure you apply firm pressure against the miter gauge/sled fence and not putting too much stress on the saw blade. Take light passes, much like at a router table, pushing the jaw slightly forward between each pass. Once you make your pass with the gauge hitting the stop you set in the previous step, you're done.

While you are at the table saw, it's a good idea to establish the fillet cuts on both the front jaw and rear batten. Simply raise the table saw blade to meet your mark and make a crosscut (photo 8). It's a good idea to remove a bit more material beyond the fillet and into the waste sections where the curves are—this will provide clearance for your bandsaw blade when making subsequent cuts.

At the bandsaw, cut the curves at the ends of the front jaw and batten using a 1/4" wide blade. Make sure your blade is square to the table and try to stay just outside of your line in the waste section—this will save you a ton of time cleaning things up later.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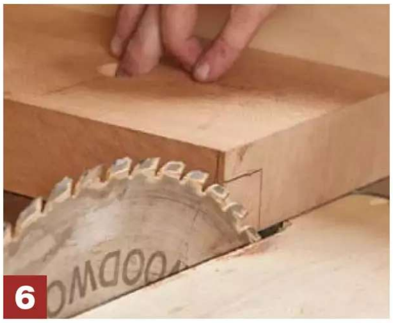
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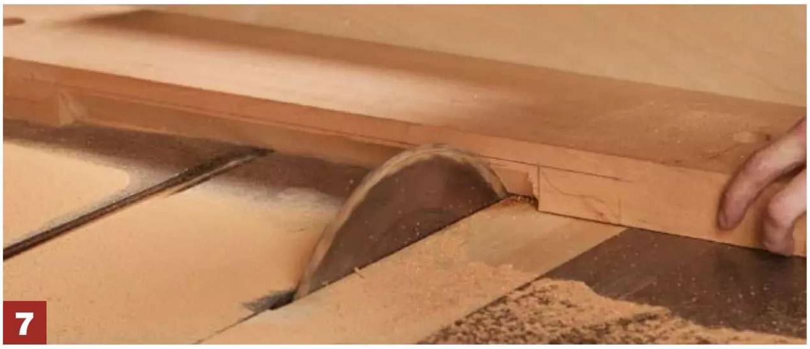
5 Define the ends of the chamfer with a hand saw.

6-7 Wasting away the chamfer is done at the table saw. You'll set the blade to the appropriate height, then slide the workpiece left and right to nibble away the waste in several steps. This leaves a small "hollow ground" chamfer that is easy to clean up with hand tools.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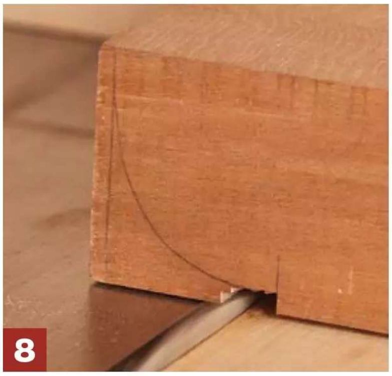
8 Define the shoulder on the ends of the front jaw.

9 At the band saw, cut away the rest of the waste.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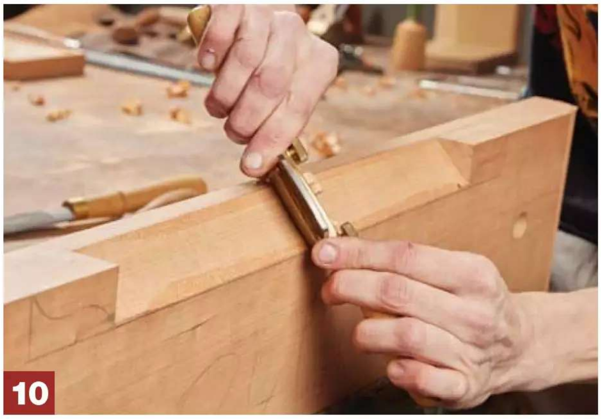
Moving to Hand Tools

With that, all the power tool work of shaping the front jaw and batten are done. The rest of the work is simply using hand tools to take any remaining waste down to your final marks. Start by bringing the stopped chamfer down to the final dimension. The table saw cuts you made previously will leave a chamfer that appears as "hollow ground." Start removing material using a flat bottom spokeshave. The high points of the "hollow ground" chamfer will do a good job of keeping you stabilized. Remove as much material as possible, repeatedly checking your lines on the top and face of the jaw to ensure you don't go past them.

The spokeshave won't be able to reduce the chamfer to final dimensions near the extremes, so use a chisel to lightly pare this section down, keeping firm pressure against the established section of the chamfer as you go. Finish the chamfer off with a series of cards, scrapers, rasps, and sandpaper.

With the chamfer fully established, move on to cutting the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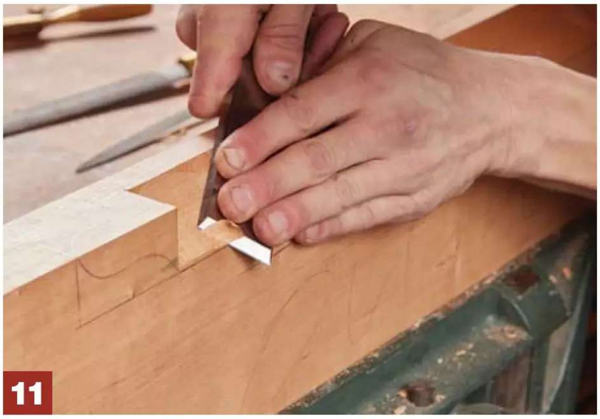
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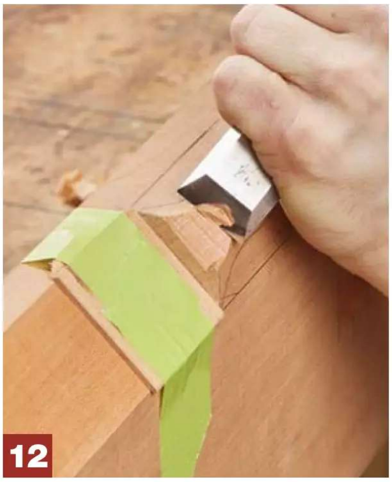
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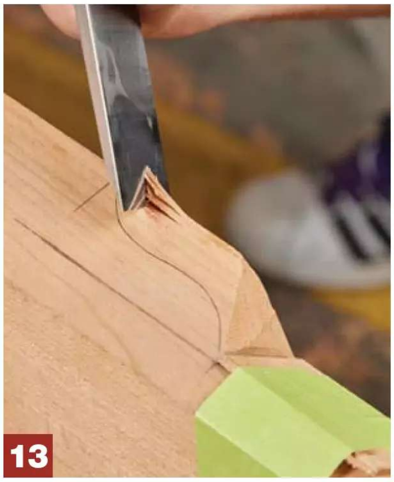
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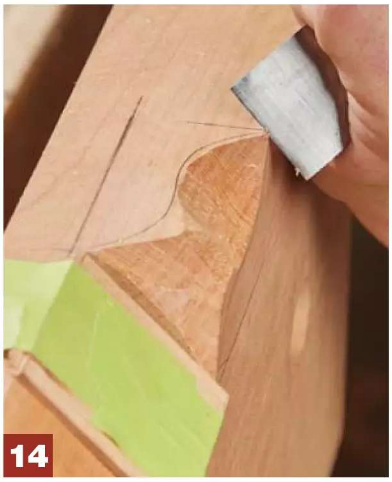
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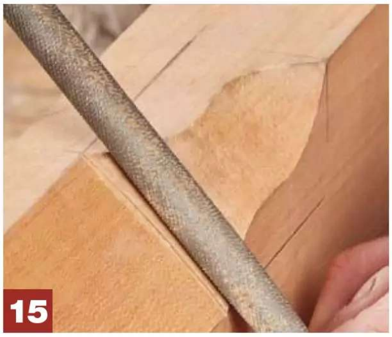
10 A spokeshave knocks of the high corners of the chamfer.

11 Pare down to the ends of the chamfer using a wide chisel. Light slicing cuts work best, especially if the grain starts to change direction.

12-15 Tape a piece of veneer over the chamfer to protect it, and start to chop away the lambs tongue detail. I use a flat bench chisel, bevel down to make most of the cuts. Follow the layout lines closely. Once the heavy material removal is done, you can switch over to a fine-cut rasp to smooth out the shape.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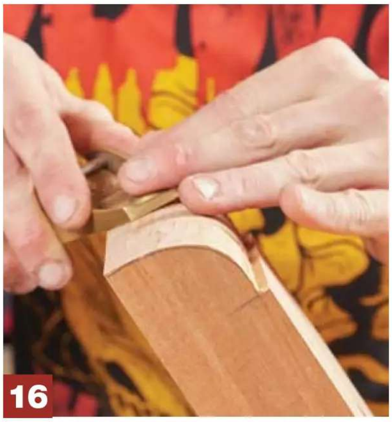
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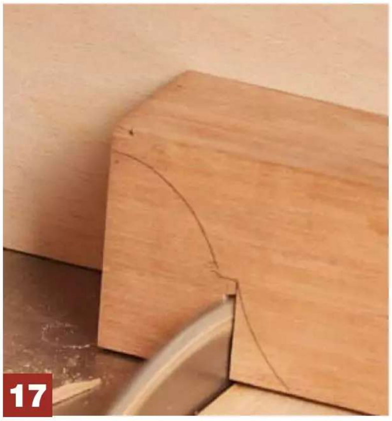
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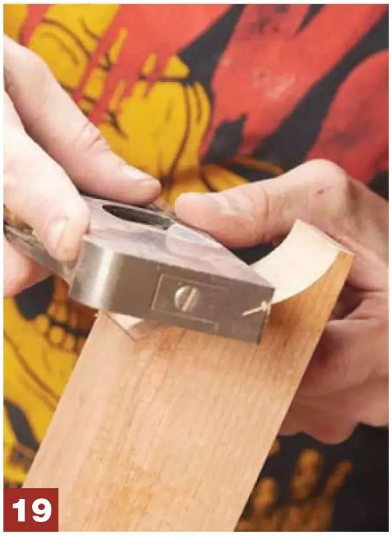
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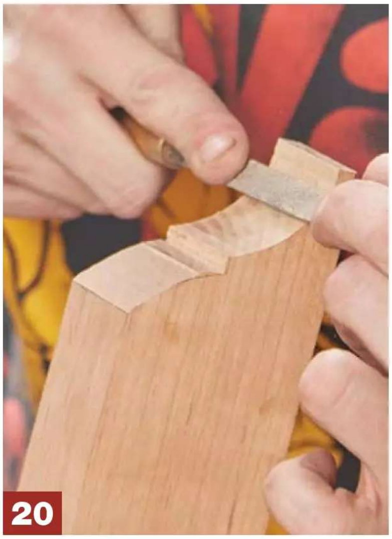
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16 Round over and smooth the ends of the front jaw using a block plane.

17-18 The ogee on the round batten has a fillet half way. Define this at the table saw before cutting away the waste at the band saw.

19 Use a shoulder plane to clean up the shoulder of the fillet.

20 Again, the fine-cut rasps really helps smooth out these curves. Use the rounded side to follow the shape the best you can.

lamb's tongues. Before carving, I like to tape a scrap piece of veneer to the chamfer, just in case my chisel slips.

I do all my carving with a 1" bench chisel, which is easy enough as long as you orient the bevel properly during cuts. I start by knocking the corner next to the chamfer down. Since this section is where the outside curve of the lamb's tongue is, I keep the bevel of my chisel up. This lets me properly curve the chisel as I carve to follow my pencil lines.

After removing some material here, I'll move to the other section of the lamb's tongue. This section should be thought of as two separate curves that meet at a trough. The key to successful carving here is to keep the bevel of the chisel down (since both are inside curves) and to have your chops start at the peak of the curve and terminate at the trough. This means carving this section by attacking the curves from both sides. If you try to do all the carving from one side, you'll inevitably have to make a chisel cut that starts at the trough of a curve and goes to its peak, a move that will undoubtedly result in grain blowout.

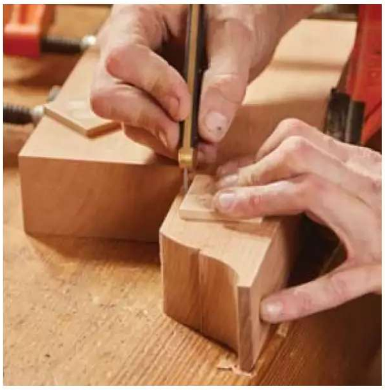
As I work, I constantly move to different sections of the lamb's tongue, removing a bit of material from one spot before moving on to another. As I get closer to my lines, my chisel chops will become controlled paring cuts, with my dominant hand steering the chisel by the handle.

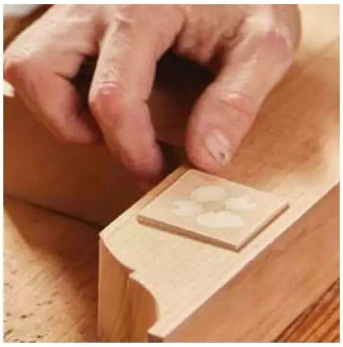
Once I've removed as much material as I'm comfortable with using a chisel, I'll switch to a fine-cut rasp. Try to make sure you aren't rounding the profile of the lamb's tongue as you work to your lines—repeatedly checking across it with a straight edge helps to keep it nice and flat.

Shaping the ogees of the batten and front jaw is much more straightforward. Clean up the fillets on both the batten and the front jaw using a shoulder plane. Remove any bandsaw marks on the ogees using a series of hand planes, rasps, or whatever you have. Just make sure you check your lines on both sides as you

Marquetry Panel Inlays

While the glue dried, I decided to inlay some marquetry panels of dogwood flowers into each side of the batten. The process here is straightforward—I put the panel in place, score its location with a knife, rout out the bulk of the material with a router, then finish off the recess with a chisel.





A Transfer the shape to the batten with a marking knife.

B Rout out most of the waste with a hand-held router.

C Drop a chisel into the layout lines and trim them down.

D Test fit the panels into the mortises.

work, and repeatedly check across the profiles with a straight edge to ensure they are staying flat as you go.

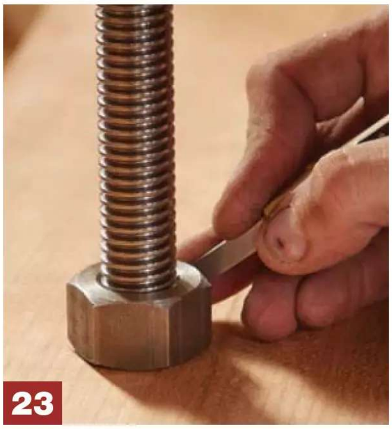
Moving to the Batten

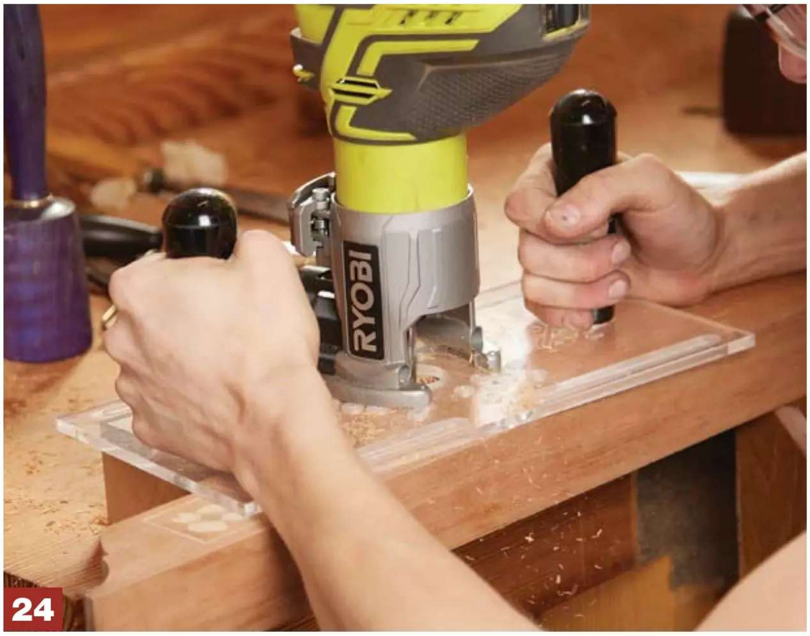
Edge glue the batten to the rear jaw. After the glue has dried, clamp the front jaw on the rear jaw/batten assembly. If you follow the cut list, you'll notice that the front jaw is about 1/8" wider than the rear jaw. This is intentional—line up the front jaw so the top is flush with the top of the rear jaw. This will allow you to easily register the vise against the front edge of your bench.

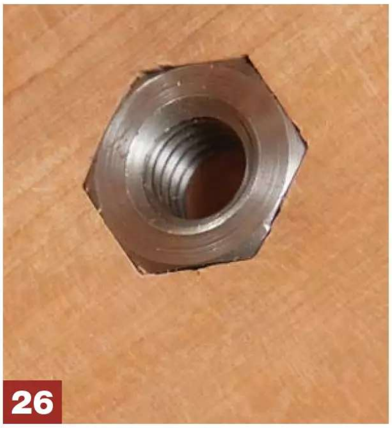
Next, with the front jaw clamped in place, use a 3/4" Forstner bit to mark the location of the screw hole in the rear jaw, making sure the

21 Glue the shaped batten onto the rear jaw.

22 Drill a hole through the rear jaw for the lead screw to pass through.







23 Scribe the shape of the nut on the inside face of the rear jaw. Keep the flat of the knife along the edge of the nut for an accurate mark.

24 Rout out the nut mortise close to the lines.

25 Use a chisel to square up the corners.

26 The nut, fit into the mortise, with no epoxy or glue necessary.

bit is roughly centered along the elongated hole on the front jaw.

Remove the front jaw and drill a 3/4" hole through the rear jaw at the locations you marked in the previous step. Thread one of the nuts on the end of each screw and pass it through the back of the rear jaw. Thread the second nut on each screw until the screws are firmly secured to the raw jaw. Align the nut on the inside of the rear jaw to your liking, and with a marking knife pressed firmly against the edge of the nut, mark the location of the nut. Now, the task is to chop that nut shape out.

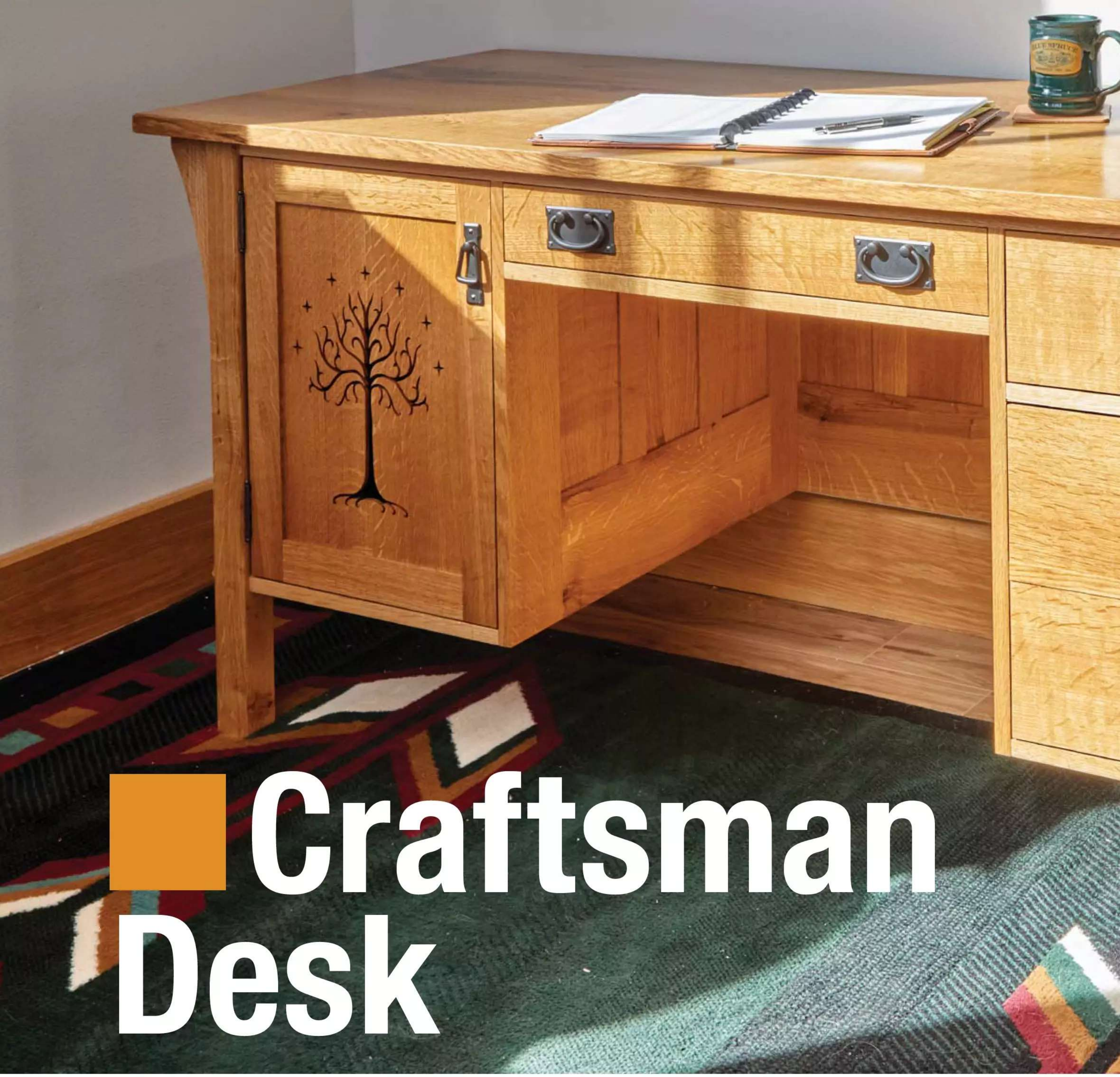
Using a 1/4" upcut spiral bit, rout just shy of your marks to a bit deeper than the nut's height. Finish the walls of the nut recess off with a chisel and check to make sure it sits below the surface of the rear jaw when in place.

Thread and fasten both screws through the rear jaw, making sure the nuts on the interior of the jaw are fully recessed. Slide the screw springs over the screws, then fit the front jaw over the screws and fasten the wheels. With the front jaw closed, plane the top of the rear and/or front jaw until they are flush.

Finally, line the jaws with some form of grippy material. The *Bench Crafted* hardware comes with rubber for the jaws. I use contact cement to apply it. Alternatives you could use would be sheets of cork or leather. If you use leather, you can apply it with contact cement or hide glue.

As an added decoration, I inlaid a few marquetry panels into the rear batten. If you've never tried a marquetry panel, this is a great place to try it. Shop projects like this are great practice pieces for new techniques. Now, you can leave the vise unfinished if you'd like, but a little oil adds some protection and nice color.

PW—*Albert Kleine*



Craftsman Desk

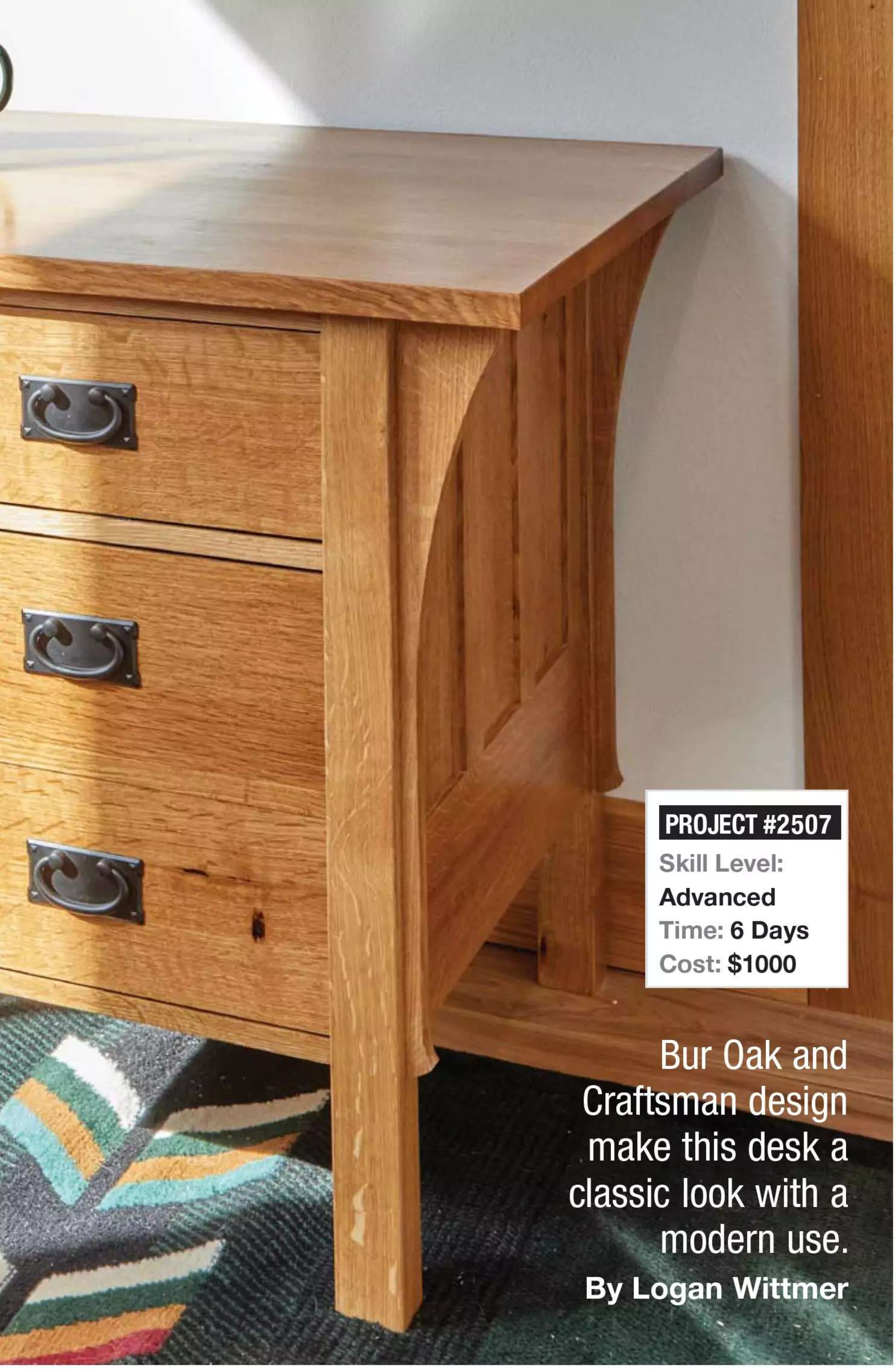
It's often times that woodworking projects come out of necessity. Take this desk for example. As I built my new shop (that doubles as Popular Woodworking's shop), I built room for an office. After all, my job's not all fun and games in the shop. After trimming out the office in bur oak, I decided I was going to keep with that theme. And as much as I love shaker design, I couldn't bring myself to make an oak shaker desk.

With the character and look of this grungy oak, I knew that I really wanted to dive into the Craftsman style. I found a few photos of a Stickley desk in this style and decided to make it my own. What I came up with was a scaled-down version (not nearly as deep), and designed to house all of the tech equipment that I use on a daily basis. Instead of a set of five drawers, my version has two drawers, a keyboard tray, and a large computer cubby with a cut-out for airflow.

From the Ground Up

For most of my projects, I start with the legs and build up. This desk is no exception. I was pulling really hard to have as much quarter sawn material on this desk as I could. Using quarter-sawn material for legs leaves you with two

PHOTOS BY LOGAN WITTMER



PROJECT #2507

Skill Level:
Advanced
Time: 6 Days
Cost: $1000

Bur Oak and Craftsman design make this desk a classic look with a modern use.

By Logan Wittmer

faces that are plain-sawn. That is not what I desired. So, instead of veneering these legs, I decided the best option was to miter the legs, and build a set of hollow, locked miter legs. This starts off by selecting enough quartersawn stock for four faces, of four legs.

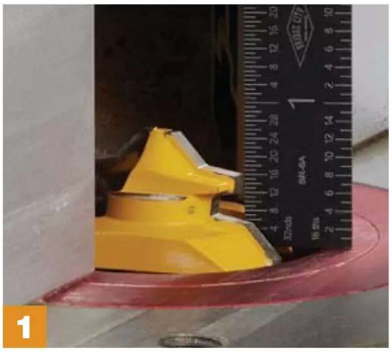
If you've never used a locking miter bit, here's a little info. Basically, the bit creates a miter with a tongue and a groove on it. These

1 Set the bit so that it's as close to centered on the thickness of the stock as possible.

2-3 Make test cuts in both orientations, and cut the tests apart to check the fit on themselves.

4 Rout two parts of each leg with the faces against the fence.

5 The other parts are laid flat.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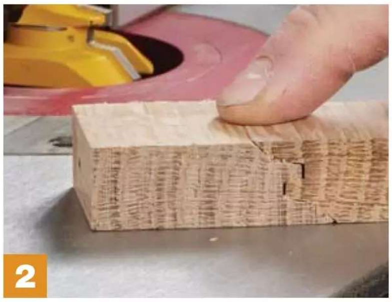
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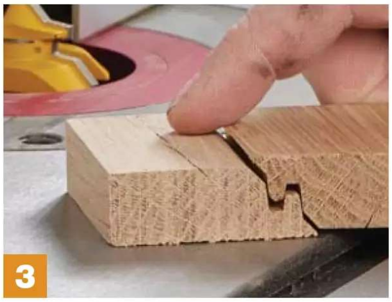
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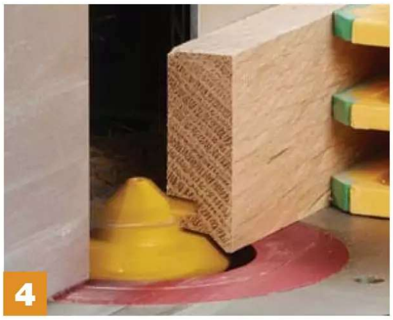
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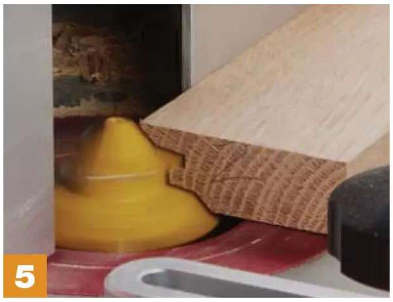
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lock into the mating parts. Two parts of the leg are routed against the fence (photo 4), and the other two are routed laying flat (photo 5). The set up is a bit tedious — requiring delicate balance of bit height and fence location. A lot of test cuts are necessary, but it's not difficult to dial in. First, you'll want to test your set up laying the piece flat. Cut a test, then chop that piece in half, so that you can match the joint to itself (photo 2). If the surface is flush, perfect. If it's not, adjust the bit and test again. Next, you can cut a test with the part flat up against the fence (photo 4). Do the same thing — cut the test piece apart and check it (photo 3). If the faces are flush, fit your first test togeher with the second one, and see if it's a tight miter.

Once the set up is dialed in, you can rout your parts. You're going to rout eight pieces in each orientation, both edges of each. This will yield enough parts to put together four perfectly quartersawn legs. I'm going to point out that I cut this locked miter (and many other parts later on) on my shaper—it's a tool that's been around a long time and I think is under utilized in the shop. Keep an eye out for a future article focused on shapers.

Now, the legs are glued together. The locked miter is self registering, so you just glue and clamp. You can see this in the photos below. After trimming the end and cutting the legs to final length, you're left with a square leg with great grain all the way around. I outlined the joint line on one corner in photo 8 below, just so you can see how tight these come out. Of coures—you could chose to not be picky about your stock like I am, and either use 8/4 solid stock, or veneer the faces. I wont shame you for whatever you chose.

The Joinery

Before I start describing anything from a technique standpoint, I want to paint a broad picture of this desk and the joinery on it. Everything here is frame and panel construction. That means that the sides, the back, and the interior panels all use the same general joinery. We'll talk about that in a bit. But first we need to prep the legs to fit some of the frame and panels, as well as some dividers.

This desk has four legs, as you may have deduced. All of the legs have grooves to fit tongues from the side or back panels. The front legs get a few notches for various reasons, as does the back left leg. What I'm getting at is that each leg has "shared" joinery (grooves for panels and corbels), but each leg is unique with it's notches/mortises. Label the legs, as you'll be making different joints in each.

Starting on the left hand side, the front and back legs each have a groove for the outside (left) panel, and a mortise near the bottom for bottom of the cubby. This mortise wraps around the corner of the leg. The back left leg also has a groove on the inside face for the back panel.

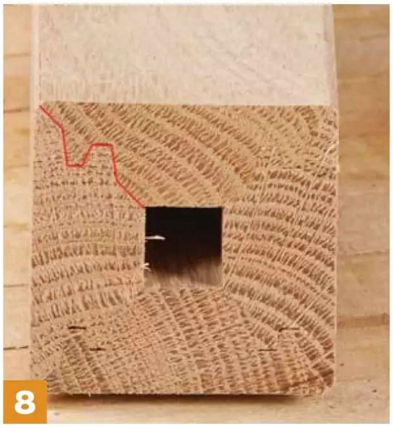
6

6 The locking miter joint creates a groove which is the perfect place to apply a bead of glue.

7 Because of how this joint sits, clamps are only needed in one direction to pull the entire leg together.

8 With proper setup, the joint is very tight, and creates a clean looking leg. I outlined one of the joints here so you can see how tight they are.

7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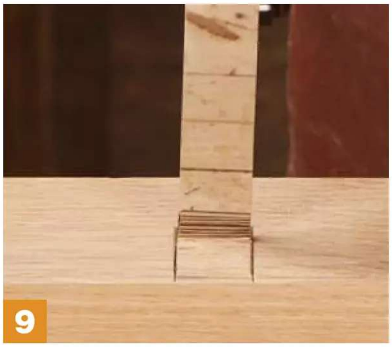
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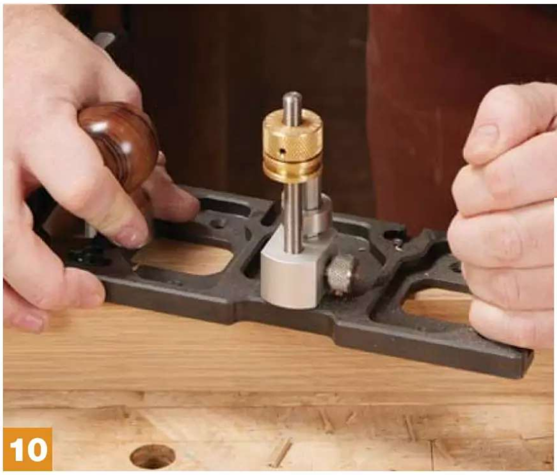
9 Define the outline of the mortise with a chisel before chopping the inside waste.

10-11 A router plane will set the final depth of the mortise.

12 Rout the grooves in the legs, for both the panels and the corbels.

13-15 A slot cutting it (or in this case, a tongue and groove shaper bit) is used to cut the groove in all of the frame parts. Do this in several steps to avoid tearout.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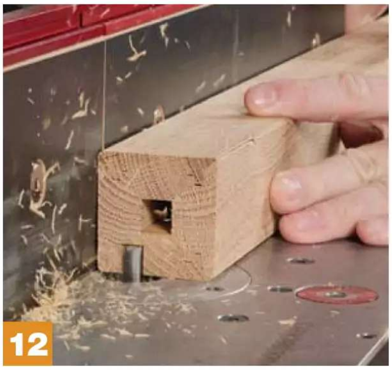
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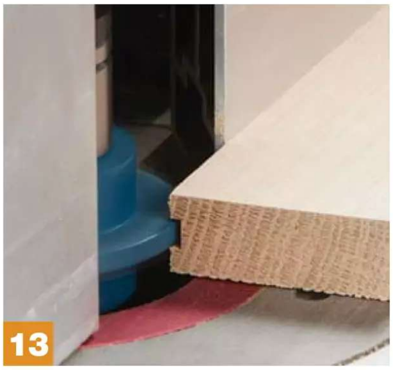
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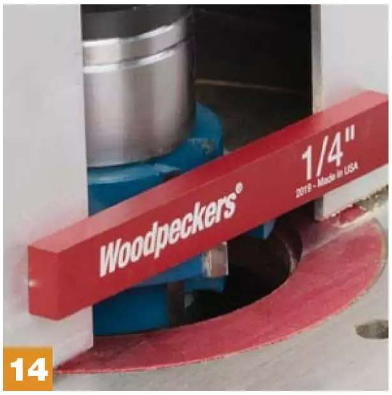
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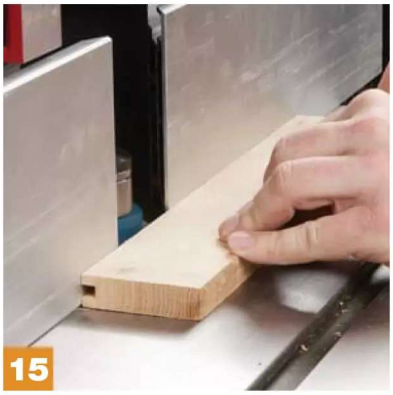
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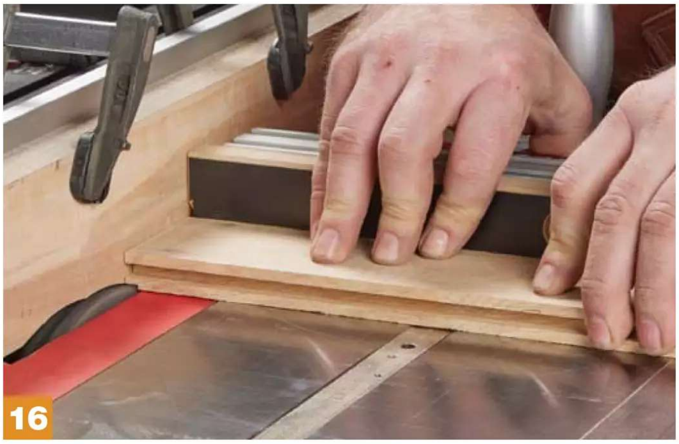
Moving to the right hand side — again, both legs have a groove for the (right hand) panel, and the back right leg also has a groove on the inside face for the back panel. The front right leg has two mortises — one each for the upper and lower drawer divider. All four legs have a centered grove on the outside face for the corbels (added later).

Whew. I hope with the aide of the illustrations in a few pages that makes sense. Let's chop some mortises. The four mortises (lower mortises on the left legs, and two on the front right leg) are chopped with a series of chisel wacks. After breaking up the fibers, I use a router plane to peel them out and leave a smooth bottom mortise (Photos 9-11).

Now, to address the grooves. Here, I chucked up a spiral bit in the router table. Two things to point out: first, the panel grooves are not centered to create a reveal with the leg. Second, these grooves are stopped about 3/4 of the way down the leg. You can do this process with one setup however. One groove is done by feeding the leg right to left, running the leg to a stop block. The next groove is made by dropping the leg over the running bit, then routing through the top of the leg. This will avoid moving the fence and multiple setups. Swap the bit out and rout the grooves for the corbels.

Frame & Panels

Now, the meat and potatoes, so to speak. Frame and panels make up a bulk of the "volume" of the desk. Here again, I'm using my shaper, but this time to cut grooves. As you can see in Photos 13-15, I do this in several passes. (Bur oak is a chippy wood, and I found that



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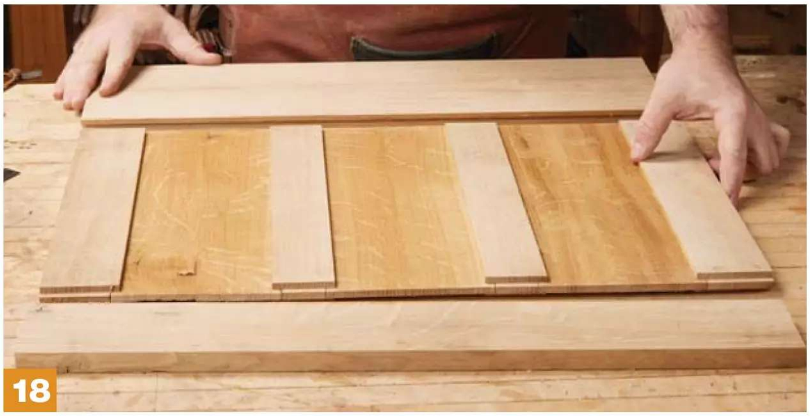

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16 Cut tenons on the ends of the mating workpeices.

17 A sharp shoulder plane takes care of fine-tuning the fit of the joints.

18 A test fit avoids surprises.

two passes reduce this). I start by making a shallow pass at half-depth. I run this through twice, flipping the workpiece end-for-end. This makes sure the groove is centered. Then, I use a setup block to dial in the final depth of the groove and make another set of passes. These grooves are made anywhere pieces meet—the inside of the rails, both edges of all of the interior stiles, and the inside edges of the outermost stiles. It's a good amount of time at the shaper when all things are considered. While I'm here, I'm making the grooves for absolutely all of the parts—the outer panels, the back panel, the interior panels, and the door. It's a lot of routing, but the shaper is a workhorse, and the dust collection makes it a clean task. I leave my Bluetooth headset on while listening to a book and working. It's a happy place.

Once the parts are grooved, a series of stub tenons must be cut to fit into said grooves. My shaper bit came with both parts—a groove cutter and a tongue cutter. However, I centered the grooves, which made the necessary tongue a bit wider, so I cut the tongues at the table saw. You can see this in Photos 16 above. A dado blade buried in an auxiliary fence is the ticket here. I leave them just a hair thick and then spend a few minutes at the bench fine-tuning each tongue with a shoulder plane (photo 17).

Now comes a dry fit. The panels that fit into the frame and panel are solid wood. (Not surprisingly, you can't find "bur oak plywood," so I resawed all of my panels). You want to test fit here—make sure the panels aren't bottoming out and holding stuff apart. With mine being solid wood, I made sure to leave enough room for them to expand during the humid months. I also took a bit of time to pre-finish them. My finishing regime on this desk was pretty straightforward. I sanded everything to 240 grit, then wiped it down with denatured alcohol. After that flashed off, I used a 320-grit sponge to do one final buffing before applying Glancy's No 1 Penetrating Oil. The stuff adds great color, but more importantly, it helps build up shellac quickly, which was my top coat. I cut the shellac back with some steel wool and dark paste wax to add a bit of character.

After confirming everything fits and the panels are finished, they can be glued up. A bit of glue on each stub tenon (none on the panels) is all that you need. A few clamps across the panel hold it tight as the glue dries.

Once the panels dry, you can take them over to the table saw. The left, right, and back panels all get tongues cut on the ends of them—these fit into the grooves on the legs. Again, I cut these fat. I want to fine-tune these with my shoulder plane to make sure

19

20

I get a good fit. When they do, I sand the entire panel and leg, and prefinish them before gluing them up. I sprayed a lot of my shellac, so I took time to apply blue tape to the mortises and any other glue surfaces. The few minutes of taping is a great trade-off for the amount of time I saved by spraying shellac after the Glancy's oil dried.

The main glue-ups are best done in steps. I first glued up left and right assemblies. The right legs are glued up to the right-hand panel and left to dry. Likewise, the left. While doing this, make sure that the top of the panels lines up with the top of the leg. Doing so it will help the top sit flat and tight on the finished desk.

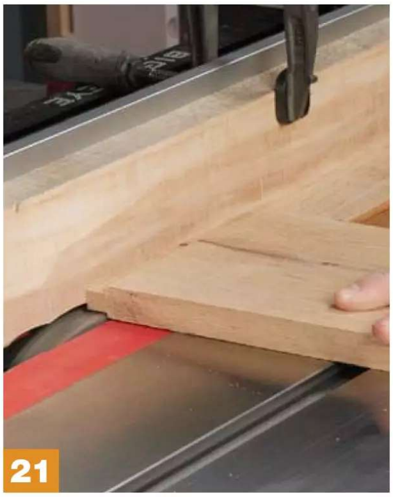
Then, once I was confident that glue was cured on the left and right assemblies, I added the back panel. This is a fairly long glue up, and required the longest clamps I had. If you need an excuse to buy a pair of long clamps, this is it.

Once I had the back joint tight, I spent a few minutes taking several measurements. In theory, the tenon and groove joinery is self-squaring. However, in practice, stuff has a little flex. This is a natural material, after all. I found that the front of the desk was slightly more open than the back. So, I applied a pair of clamps across the front to pull everything square. You can find a photo of that on the *Popular*

19-20 Glue up the side and back panels. The tongues are glued on each end, but the panels are left to float for expansion and contraction.

21 With the same dado blade loaded up, cut the tongue on the panels. This is a thicker tongue, however, so drop the blade down and refine it with a shoulder plane.

22 Glue up the panels to the legs, applying sufficient clamping pressure.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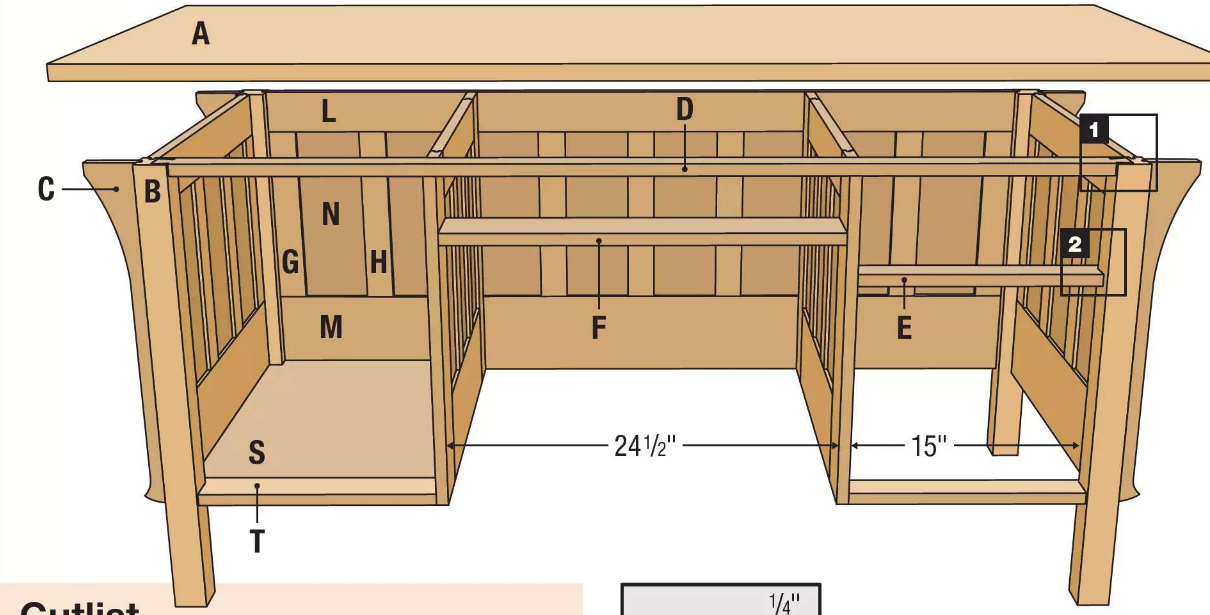
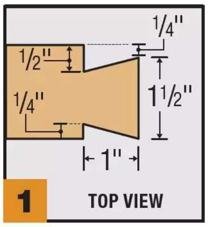
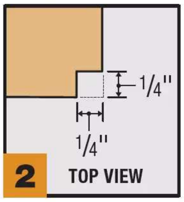
Craftsman Desk

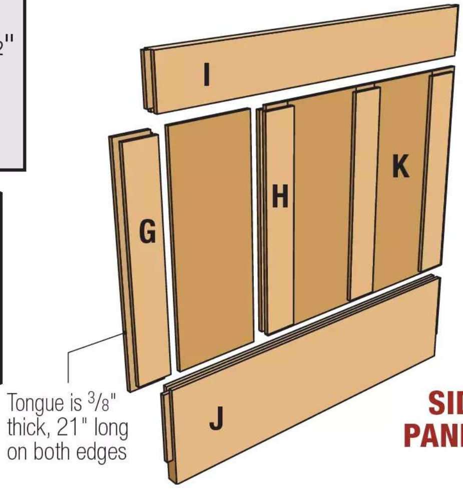


Cutlist

No	Items	T	W	L
		Dimensions (in.)		
1	**A** Top	1	28	68
4	**B** Legs	2	2	29
4	**C** Corbels	3/4	3 3/8	22
1	**D** Header rail	3/4	1 3/4	58
2	**E** Drawer rails	3/4	2	15 1/4
1	**F** Keyboard rail	3/4	25	3 3/4
	SIDE, BACK, & INTERIOR PANELS			
6	**G** Side/back panels (end stiles)	3/4	2 3/8	13 1/2
17	**H** All panels (center stiles)	3/4	2	13 1/2
2	**I** Side panels (top rails)	3/4	3	22 3/4
2	**J** Side panels (bottom rails)	3/4	6	22 3/4
12	**K** Side/interior panels (panels)	1/4	5 1/8	13 1/2
2	**L** Back panel (top rails)	3/4	3	56 3/4
2	**M** Back panel (bottom rails)	3/4	6	56 3/4
7	**N** Back panel (panels)	1/4	5 1/4	13 1/2
2	**O** Interior panel (front stiles)	3/4	3 3/4	22
2	**P** Interior panel (back stiles)	3/4	3	22
2	**Q** Interior panel (top rails)	3/4	3	18 1/2
2	**R** Interior panel (bottom rails)	3/4	6	18 1/2
	CUBBY, KEYBOARD, & DRAWERS			
1	**S** Cubby bottom (panel)	3/4	16	22 1/4
1	**T** Cubby bottom (rail)	3/4	16	2 3/4
2	**U** Cubby door (rails)	3/4	2	11 1/2
2	**V** Cubby door (stiles)	3/4	2	20 1/2
1	**W** Cubby door (panel)	1/4	11	17
1	**X** Keyboard tray	3/4	23 1/4	21 1/2
1	**Y** Keyboard tray (butler's edge)	3/4	2	23 1/4
1	**X** Keyboard false front	3/4	3 1/2	24 1/2
1	**AA** Top drawer false front	3/4	5 7/8	14 7/8
2	**BB** Bottom drawer false front	3/4	6 1/2	14 7/8
1	**CC** Bottom drawer false lip	3/4	13/16	14 7/8
2	**DD** Top drawer (sides)	5/8	5	19 1/2
2	**EE** Top drawer (front/back)	5/8	5	14 1/2
2	**FF** Bottom drawer (sides)	5/8	12	19 1/2
2	**GG** Bottom drawer (front/back)	5/8	12	14 1/2
2	**HH** Drawer bottoms	1/4	13 1/2	20

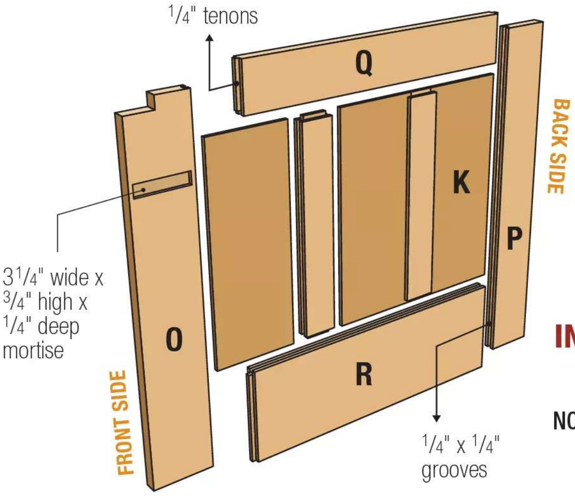






Tongue is 3/8" thick, 21" long on both edges

SIDE PANEL



3 1/4" wide x 3/4" high x 1/4" deep mortise

1/4" x 1/4" grooves

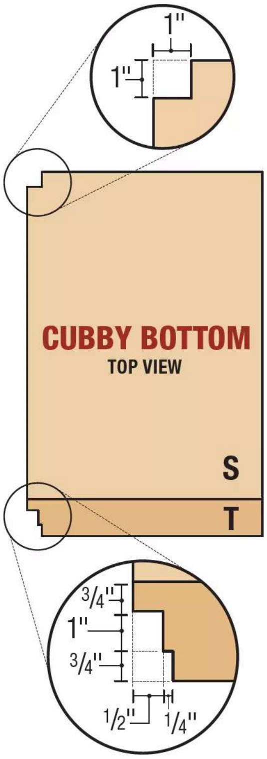
INTERIOR PANEL

NOTE: Opposite Panel is a Mirror Image

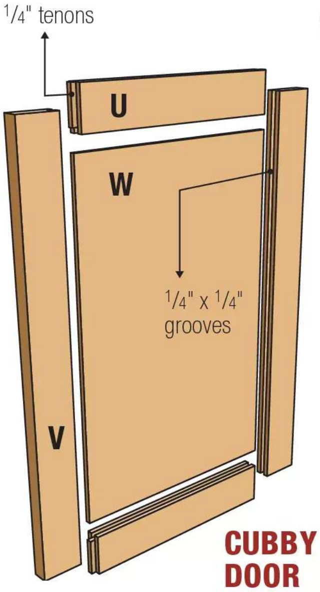
NOTE: A full Sketchup model is available at PopularWoodworking.com/onlineextras

CUBBY BOTTOM

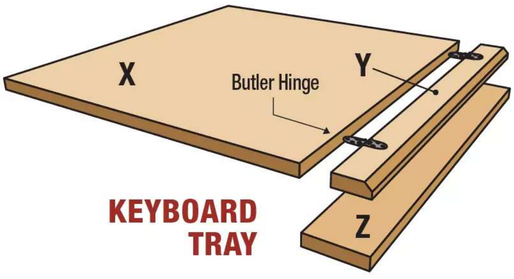
TOP VIEW


1"
1"
S
T
3/4"
1"
3/4"
1/2"
1/4"

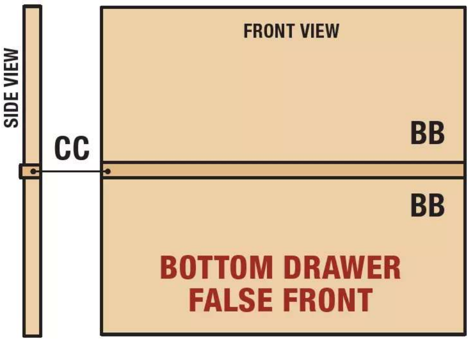
CUBBY DOOR


1/4" tenons
U
W
1/4" x 1/4" grooves
V

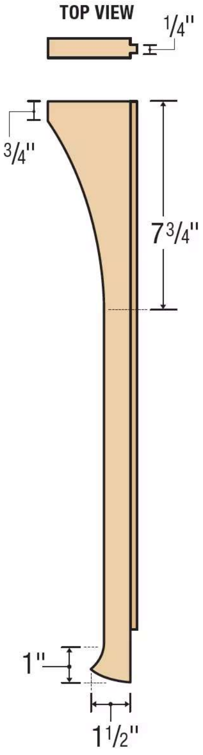
KEYBOARD TRAY


X
Butler Hinge
Y
Z

BOTTOM DRAWER FALSE FRONT

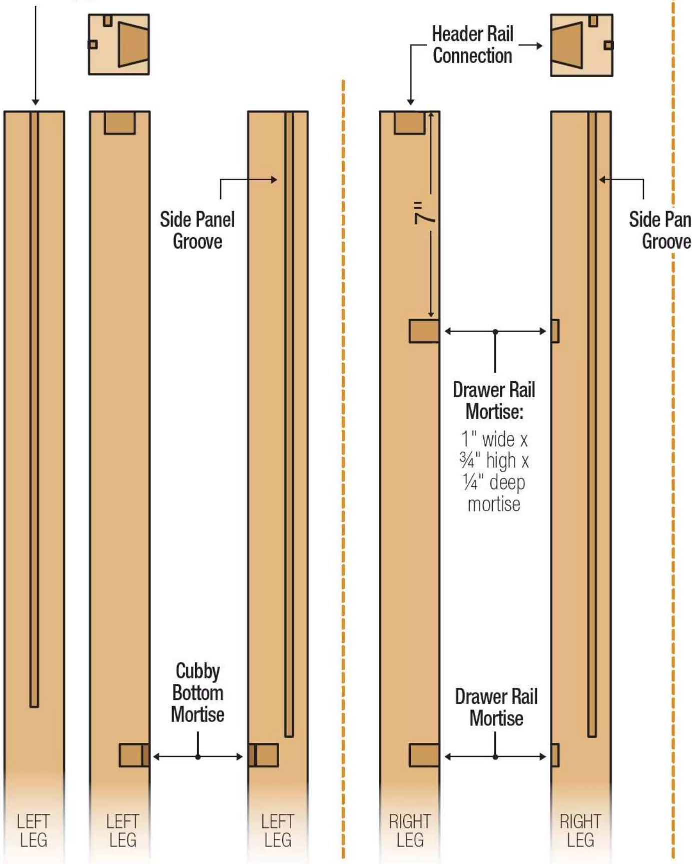

SIDE VIEW
FRONT VIEW
CC
BB
BB

CORBELS


TOP VIEW
1/4"
3/4"
7 3/4"
1"
1 1/2"

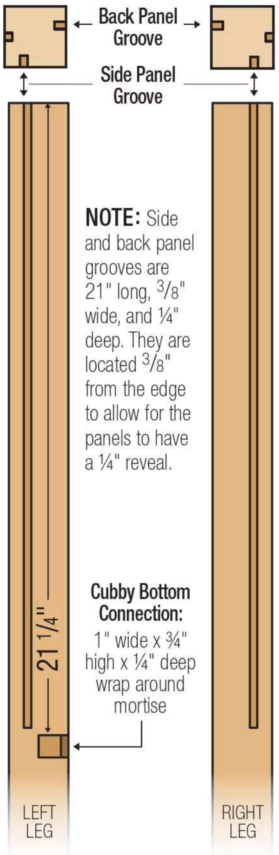
FRONT LEGS

Corbel Grooves: (all 4 legs)
¼" wide x ¼" deep x 20" long groove, centered


Header Rail Connection
Side Panel Groove
Side Panel Groove
7"
Cubby Bottom Mortise
Drawer Rail Mortise
LEFT LEG
LEFT LEG
LEFT LEG
RIGHT LEG
RIGHT LEG

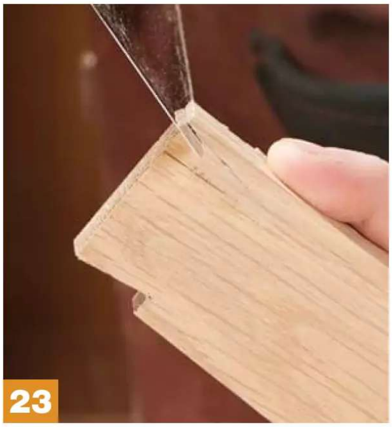
Drawer Rail Mortise: 1" wide x ¾" high x ¼" deep mortise

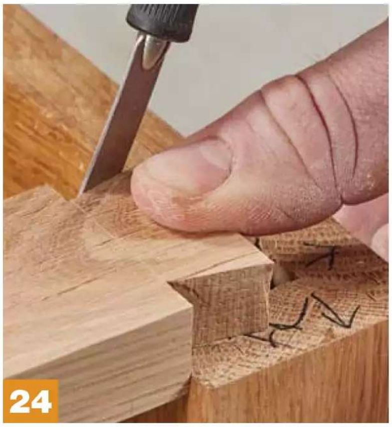
BACK LEGS

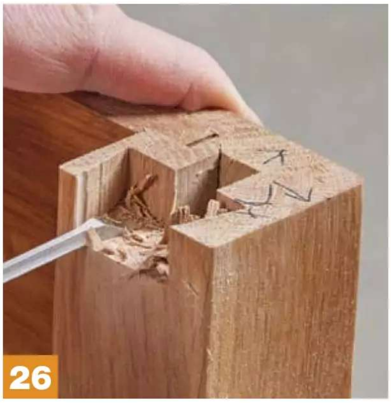

Back Panel Groove
Side Panel Groove
21 1/4"
LEFT LEG
RIGHT LEG

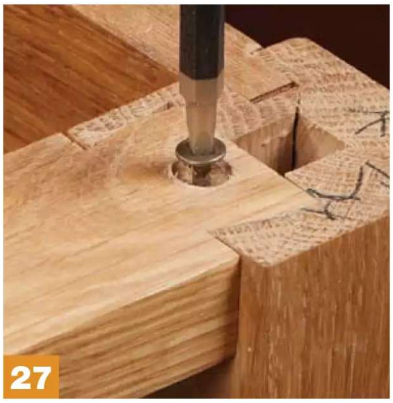
NOTE: Side and back panel grooves are 21" long, 3/8" wide, and ¼" deep. They are located 3/8" from the edge to allow for the panels to have a ¼" reveal.

Cubby Bottom Connection: 1" wide x ¾" high x ¼" deep wrap around mortise









23 Free-hand a dovetail on the end of the header rail.

24 Mark the dovetail location with a marking knife.

25 Remove the waste with a small router that's easy to balance on the leg.

26 Chisel away the rest of the waste.

27 Screw the rail into the leg.

Woodworking Instagram page if you're interested (I couldn't fit it in here—we didn't need a 16-page article for crying out loud).

Fill it Out

At this point, you have a three-sided desk with floppy wings. The next steps are to attach the fronts together (somehow) and fill it out with the innards.

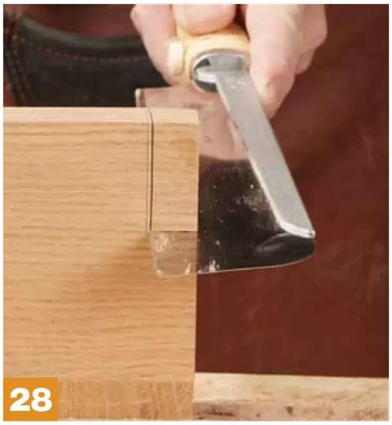
The front left, and right legs are connected via what I'm calling a "header rail." This rail is dovetailed into the tops of each leg, and set back a 1/4" for that reveal— we're keeping that as a standard reveal all over. Here's something to remember. This dovetail is hidden. You'll never see it. It doesn't matter if it's sloppy, as long as the front shoulder is tight and it fits snugly. I cut the dovetail with a pull saw at the bench (photo 23). Then, clamping it on one end, I mark the opposite end with my marking knife.

A router and a straight bit hog away most of the waste. Just be careful, keep the router balanced, and work up close to the lines. Because this is end grain, the fibers pull away pretty well with a sharp bit. After the router work, I came in with a pair of chisels. A heavy butt chisel works to drop into the marking knife line for the final shape. My fishtail chisel cleans up the corners nicely. (It's one of those tools that doesn't always get used, but is the perfect tool when you need it). The steps were repeated on the opposite leg. After test fitting, I glued it in place and drilled a pilot hole for a screw.

Okay, sturdy base, check. Now it's time to figure out what you want for storage. As I mentioned, the original one I found at auction had drawers both left and right. Instead of having that much "crap storage," I wanted something to hide my PC. So, the left side was destined to become a cubby with a door. Because everything is made of hardwood, I started by gluing up the bottom of the cubby.

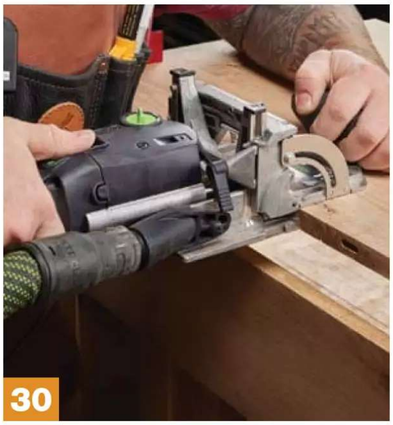
The cubby bottom is, more or less, a panel with a breadboard end. The breadboard end gives an edge-grain view when looking at the front of the desk. You can see a sneak peek of this bottom in photo 31. Now, back to photo 28. Remember those notches in the left leg? Those are to hold the corners of the cubby bottom. However, the cubby bottom also needs to be notched. I laid this out and cut it with a pull saw. It is captured in the mortise, so it doesn't need to be pretty, just large enough for it to slip in.

The interior panel is glued up similarly to the outside panels.



28

29



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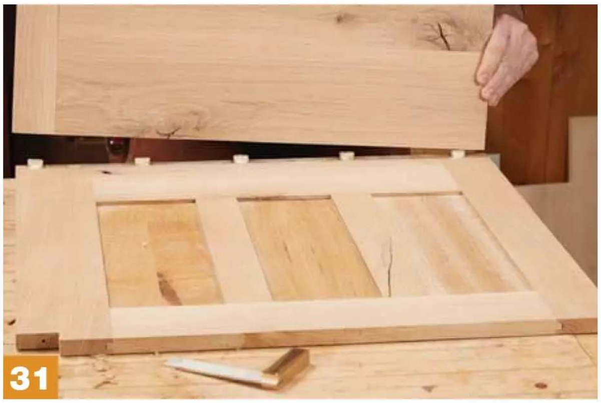
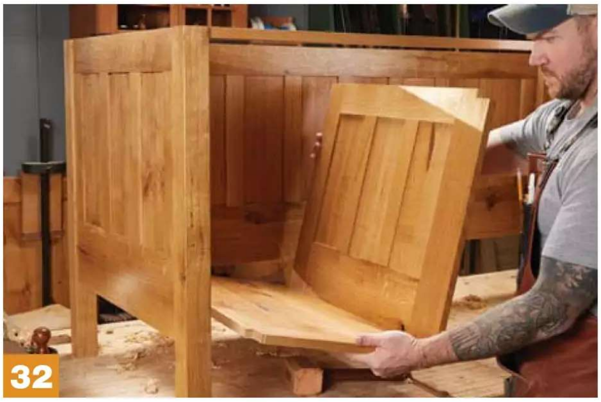


31



32

33

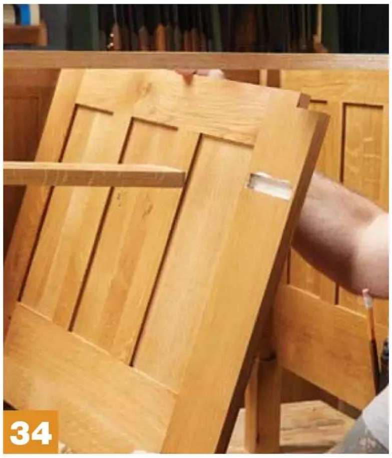
28 The bottom of the cubby is notched to fit around the mortises in the legs. A pull saw makes quick work of this.

29-31 I laid out a series of dominoes, evenly spaced across the panel and bottom. A few quick zips of the tool creates the mortises. The dominoes are glued into place, and the entire piece is clamped to dry.

32-33 The pre-finished cubby is slipped into the mortises, and is clamped against the back and header rail. Before anything is drilled, spend some time making sure everything is square. It will help immensely to make sure your cubby is square before you try and build a door to fit.

The biggest difference is that the outside stiles sit on the outside of the top and bottom rails. Again, this is for continuous edge grain the whole way down. These dimensions are also a bit different than the outside panels also — check out the illustration on pages 44 and 45. While you're working on these panels, notch the top corner to go around the header rail—visible in photos 31-33. The inside front face of the inner rail has a mortise for the keyboard divider—you'll see this in photo 34 in a bit.

The cubby bottom and the interior panel are connected together at a right angle. I chose to use dominoes here. A series of 5 dominoes added plenty of strength to connect these panels together during assembly and this desk's life. After pre-finishing, the cubby can be installed. Because the bottom of the cubby is made of solid wood, I let it float in the mortises and didn't glue it in place. I want it to expand and contract as needed. To that point, I also left a bit of a gap between the left panel and the cubby bottom. This not only facilitates that movement but also adds a bit of airflow for the computer. The interior panel is attached to the header rail with



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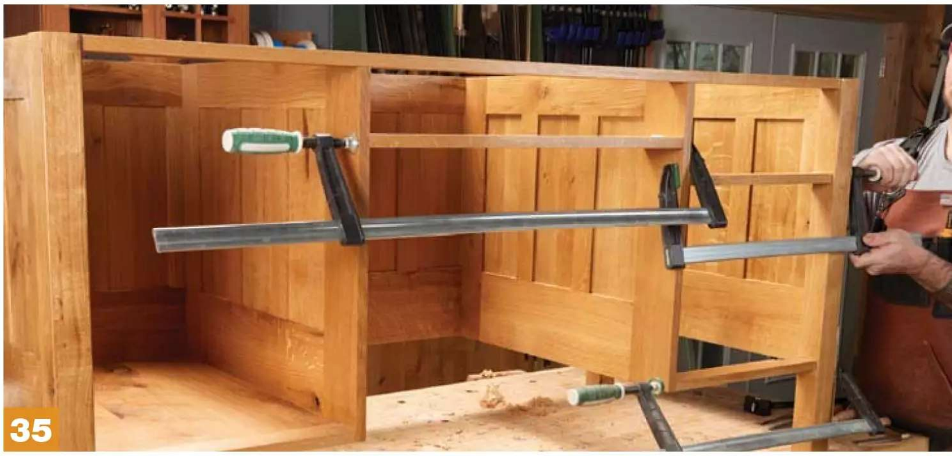
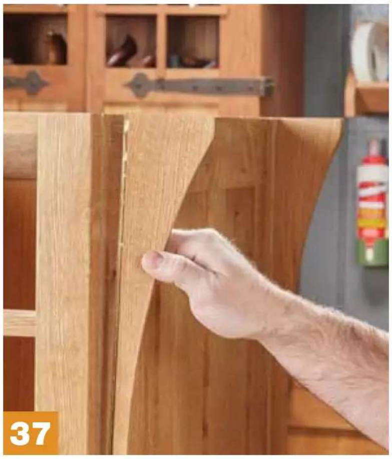


35

36



37

34 The keyboard divider is mortised into the interior panels. Spread glue into the mortise before clamping it in place.

35 Clamps strung across the dividers hold everything tight while the glue sets.

36 Flush trim the corbels to their pattern. Pay attention to the grain direction here so you don't tear the corbels apart.

37 Glue the corbels in place on the outside of the legs, making sure they're flush at the top.

a pair of screws. I'll be honest — because I placed this desk up against the wall, I also drove a few screws from the back into the interior panel. If you wanted the back panel to be visible, you could use dominoes or dowels for a bit of extra support.

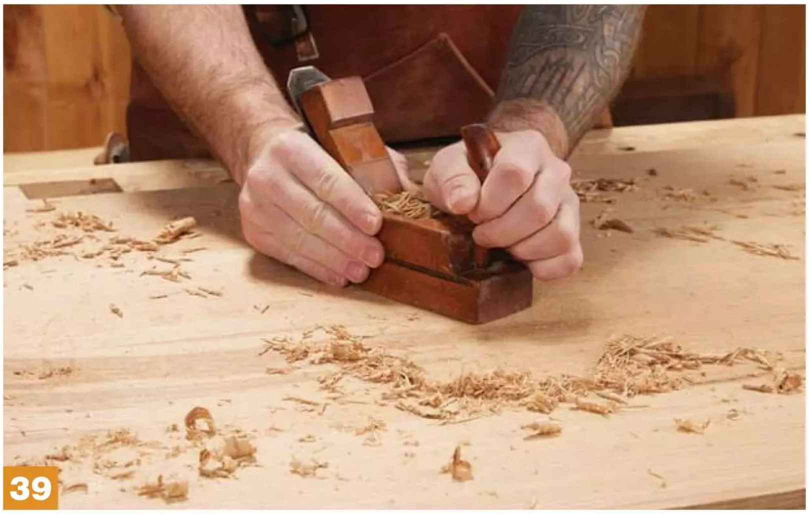
Corbels, Drawers & Top

All right, one interior cubby is done. Now, the next. The right-hand cubby is actually for a pair of drawers—a shallower top drawer and a double-deep drawer on the bottom. The interior panel here is the same as before. Notice in Photo 34 that you can see the keyboard divider mortise. This is chopped in the rail, and the keyboard divider has a small notch on the front and back to fit in with a clean look. This needs to be slipped into place (with glue) as the right-hand interior panel is installed.

Now, for the drawer dividers. These are straightforward. The right-hand side of each is notched to fit into the mortises, as the cubby the bottom was. The end that meets the inside panel is attached with a pair of dominoes in each. Though, with everything in place, nobody would know if you use pocket screws to attach them. Use what you have. There's a bit of finagling here to get the dominoes glued in place, the mortise glued, and the notches lined up, but it's doable. Once everything's in, clamp everything and turn your attention to the corbels.

The corbels are long and curved. They're a great craftsman accent. I made a template up for mine (we'll have that available to download as well). After laying out the shape and roughing it out on the bandsaw, I used a pattern bit at the router table to make all of the corbels consistent. The corbels glue into the groove on the outside of the leg. What's that? You noticed that there's no groove on the outside of that leg in Photo 35? It's not due to forgetting it during the milling stage. Definitely not. (Fine, it routed in just fine using an edge guide while the desk was 3/4 done, but it didn't make me nervous at all...). The tongue is cut on the long edge of the corbels at the table saw using the dado blade. Fine-tune it with the shoulder plane again, then clamp all of the corbels together to sand the curves. This keeps you from rounding over the edges. These

38


39

40

38 A track saw is a great way to trim a top to size.

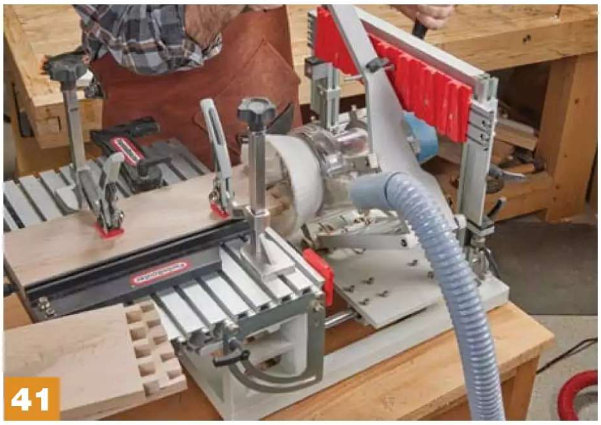
39 Scrub down the joint to prepare it for the smoothing plane.

40 Sometimes, you have to get weird with your planing and pull it towards you.

get finished and glued in place on the outside of the legs. In that groove, that you did not forget to mill in them.

Now comes the show stopper. I think the top of any desk or table is one of the most important pieces. It's the largest area and sees the most attention and use. I started with extra-thick stock. Trying to find 8/4 boards of bur oak that were relatively clean was a chore. However, luckily, I have a large stash and a skid loader to uncover some in my dried lumber stock. Even these have a brown "birthmark" on one of the boards. I like the character.

The top is milled to thickness in several stages to allow the wood to move how it wants. At the end of it, I had two halves of the top glued up and planned those down to the final thickness. Then, I did one final glue-up to complete the top. I took time here to add clamps and cauls to keep the two halves even. I was mostly successful, with only a small ledge where the two joined. And that's okay—it gave me a chance to break out one of my vintage scrub planes and go to town. Side note—this plane in Photo 38 is a vintage Johann Weiss & Soh plane from Austria in the early 1900's. I don't use the European horned planes often (just not common on this side of the pond), but I do enjoy it. It has a great iron, and there's something about wood-on-wood that I enjoy. After knocking off the ledge, I switched over to my smoothing plane to smooth out the surfaces you can feel. I left the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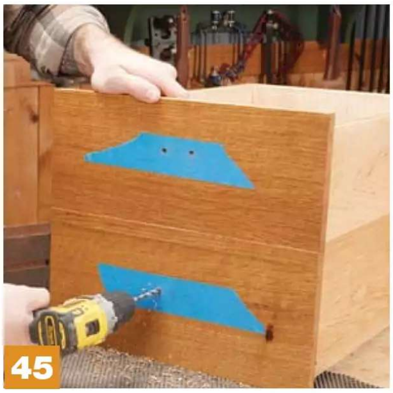

45

46

41 The PantoRouter makes quick work of the dovetails, both pins and tails.

42 Round over the top of the drawer boxes.

43 The bottom slips into place and is attached with a screw.

44 Screw the false front in place.

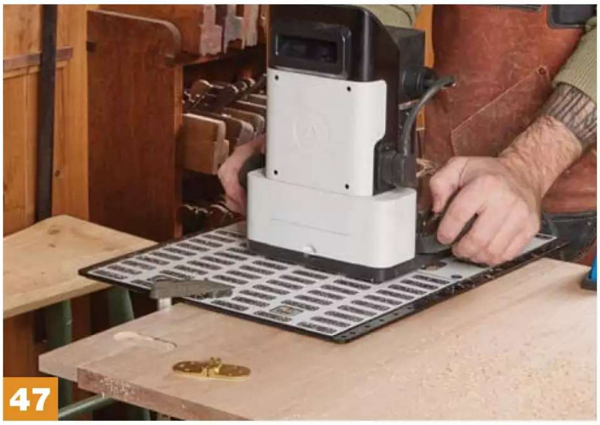
45-46 Drill and install the hardware on the drawers.

scrubbed surface on the underside of the top, where you'd need to look for it. A little treat for future generations.

The top is attached with a series of Z-clips around the inside of the desk. I mount these into biscuit jointer slots — it's easy to reach in and just zip them where needed.

Now comes the drawers and door. The drawers are nothing crazy. Standard dovetailed drawer boxes with false fronts. I dovetailed the boxes with my PantoRouter, but do it how you'd like. The false fronts are installed with screws, and the hardware is attached. Notice that the lower drawer has a faux divider across the face of the drawer. This gives the appearance of 3 drawers, but in reality, the bottom is a deep one. It is a fun little detail. The drawers are installed with bottom-mount drawer slides, screwed to the drawer dividers, and a mounting bracket in the back of the drawer case.

The keyboard tray tray needed a bit more thought than just a simple pull out. I wanted it to appear as a drawer, so that it matched the aesthetic. My solution is shown in Photos 47 and 48. A pair of butler hinges attach the tray to a front panel. This front panel is then attached to a false front, matching the look of the piece. A magnetic catch hold it vertical in the closed position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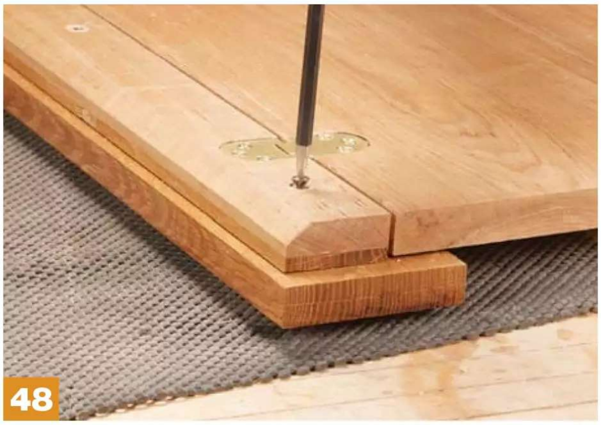
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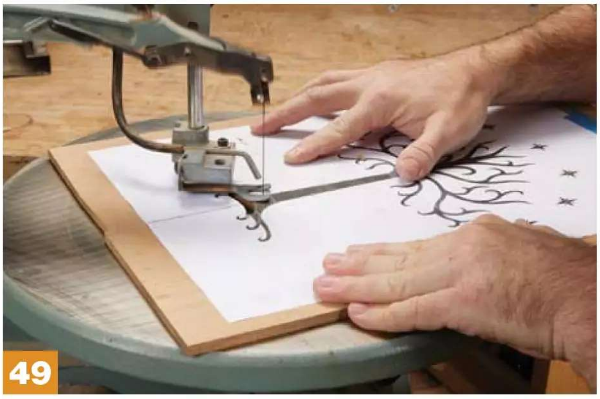
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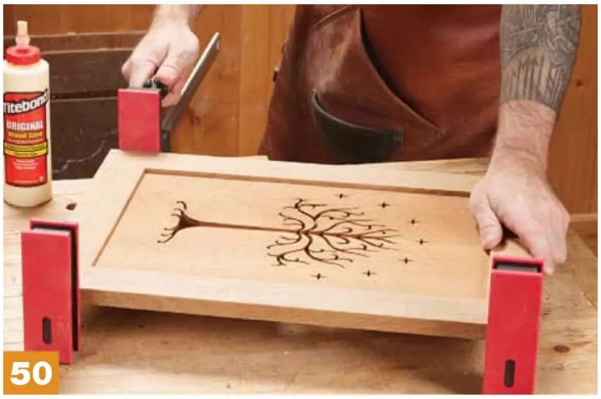
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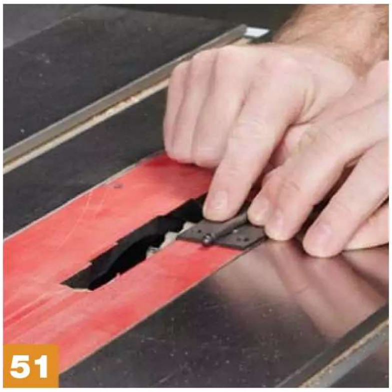
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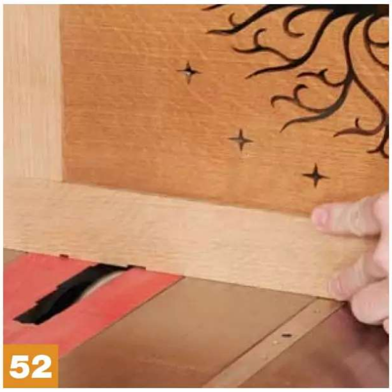

52

47 *Origin* makes routing these butler hinge mortises easy.

48 Here you can see the action of the keyboard tray.

49-50 The door panel is cut out with a scroll saw. Sit down, grab a cup of coffee, and follow the lines.

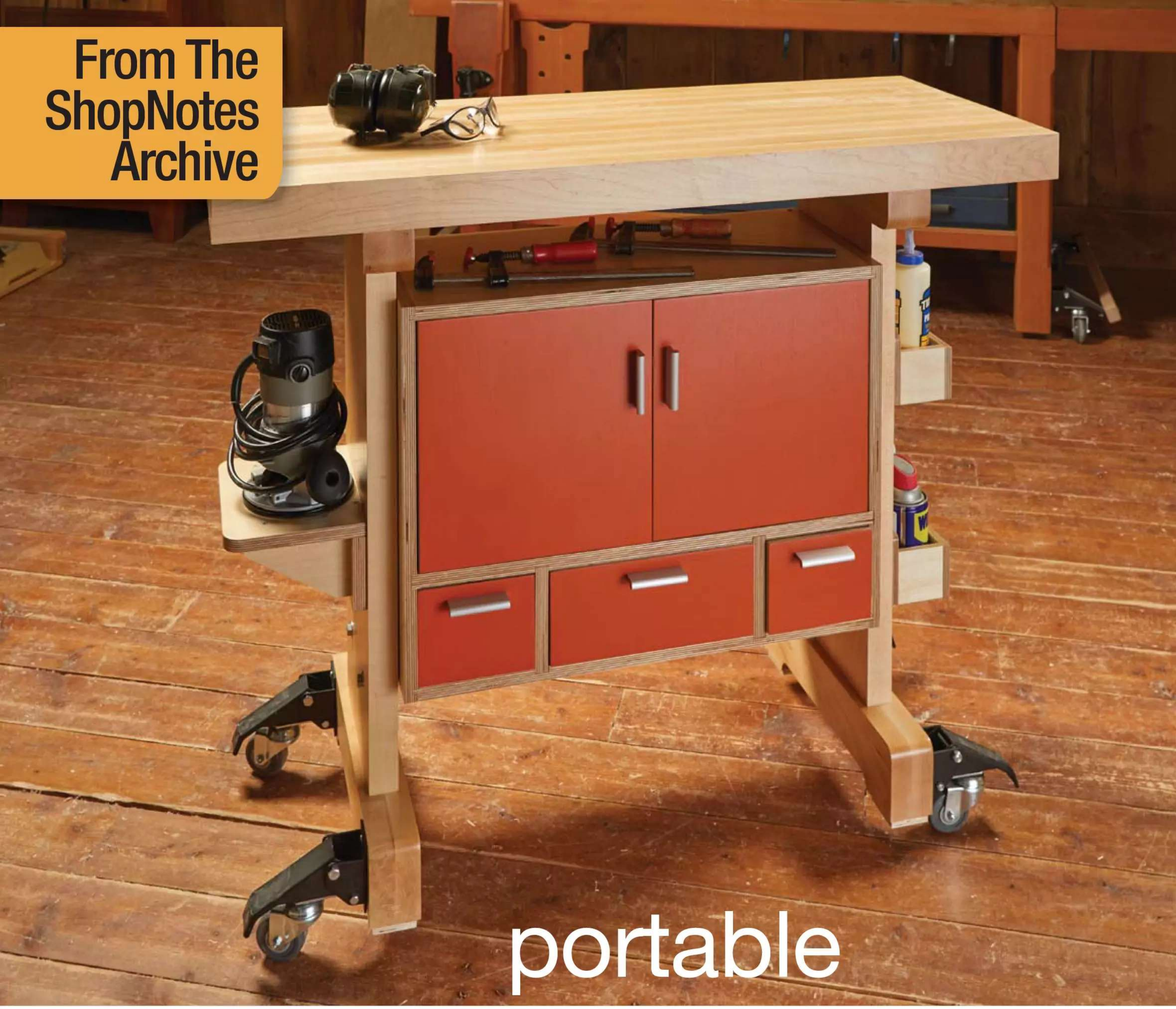
51-52 The hinge mortises are cut out at the table saw.

when stored, but it lays flat when pulled out.

The final piece of the puzzle is the door for the cubby. I wanted a door with some ventilation for the computers. I opted for a decorative cutout. Some of you may recognize this image as the icon of the one that grew in the court of the fountain in Minas Tirith. I'd provide a template for this, but I'm afraid Peter Jackson may come after me if I do. The pattern is printed out and applied to a panel. A few hours at the scroll saw left me with a door panel that I am pleased with. (I'm a big Lord of the Rings fan; what can I say). The panel is installed in a door frame made with the same tongue and groove joinery as the rest of the desk panels. I bought a nice pair of butt hinges to install the door. The stiles were mortised at the table saw. First, set the blade to match the hinge leaf thickness. Then, just nibble it away until it's full width. Positioning the door for mounting was done with a few of the 3D-printed spacers that I showed in my Editor's letter. You know, the last desk I really built was back in high school. That desk is still floating around somewhere today. I'd like to think that both of these will be floating around at some auction in a hundred years, inspiring another woodworker.

PW *–Logan Wittmer*

From The ShopNotes Archive



portable Workbench Sidekick

Workbench clutter is real. In the flurry of a project build, I need a place to set something down and there just isn't an open space. That's the issue that inspired this project.

Of course there's more going on. It's plain to see that this isn't just another flat surface. The top is a thick solid- wood lamination. The trestle-style legs are beefy, too. When combined, you have a sturdy, multi-purpose workcenter. You can glue up a sub-assembly here. Or perhaps set up a jig for dovetailing drawers. Maybe you just need your workbench to be a little longer.

Storage and staging are other jobs this sidekick handles with ease. The cabinet below keeps tools and supplies close. Throwing in a couple bins and a shelf add even more options.

No matter the size of your workshop, mobile solutions allow you to tailor your space to the task at hand. Flip-up "workbench casters" go from stable to on the go in short order.

Along the way, you'll pick up a few woodworking lessons that you can apply to furniture projects. It's time your shop had a dynamic duo to make your work flow smoother.

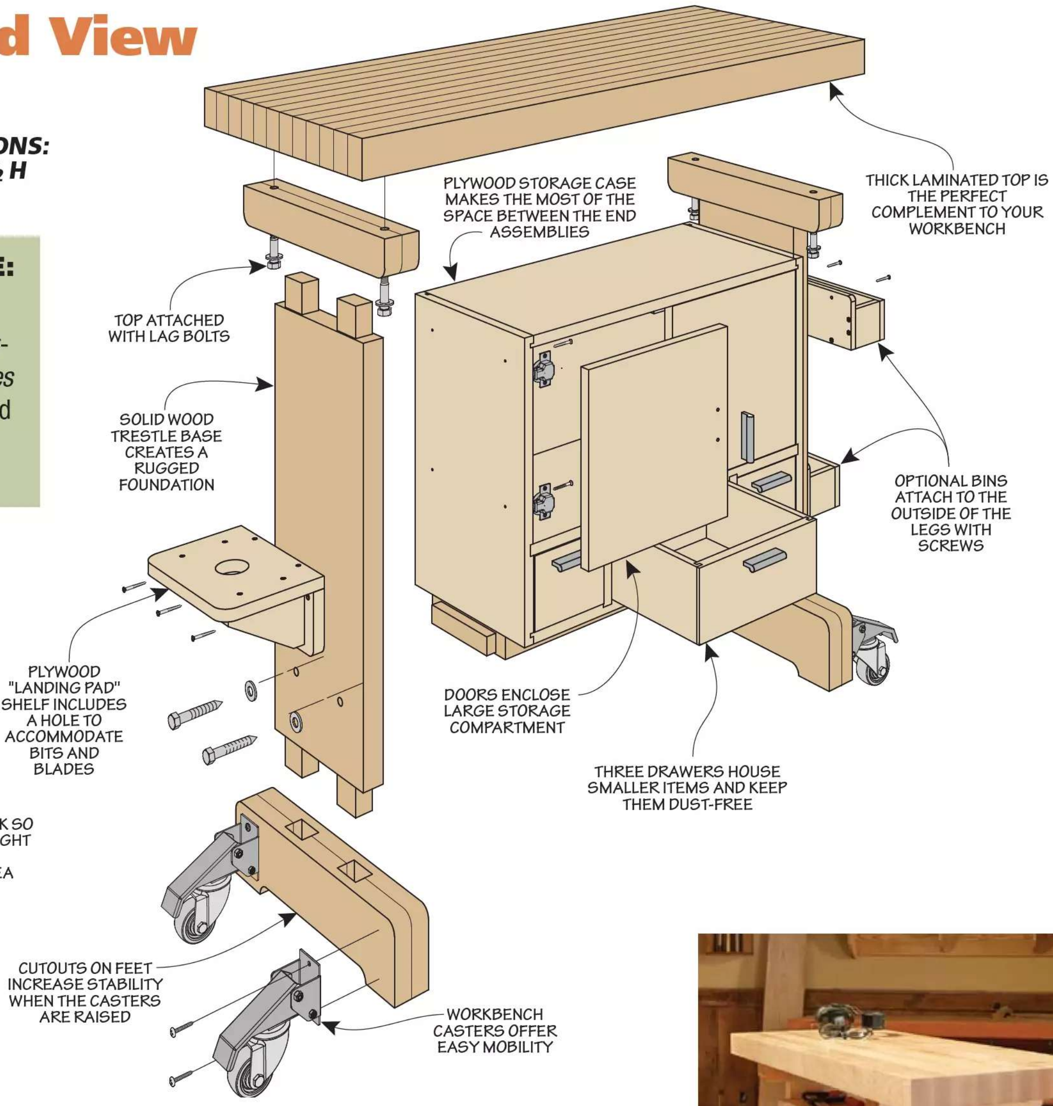
Written by: Phil Huber; Project Design: Chris Fitch

Exploded View Details

OVERALL DIMENSIONS:
18"D x 44"W x 36½ H

EDITOR'S NOTE:

This article originally appeared in our sister-publication, *ShopNotes Magazine*. You can find more information at ShopNotes.com.



PLYWOOD STORAGE CASE MAKES THE MOST OF THE SPACE BETWEEN THE END ASSEMBLIES
THICK LAMINATED TOP IS THE PERFECT COMPLEMENT TO YOUR WORKBENCH
TOP ATTACHED WITH LAG BOLTS
SOLID WOOD TRESTLE BASE CREATES A RUGGED FOUNDATION
OPTIONAL BINS ATTACH TO THE OUTSIDE OF THE LEGS WITH SCREWS
PLYWOOD "LANDING PAD" SHELF INCLUDES A HOLE TO ACCOMMODATE BITS AND BLADES
DOORS ENCLOSE LARGE STORAGE COMPARTMENT
THREE DRAWERS HOUSE SMALLER ITEMS AND KEEP THEM DUST-FREE
CUTOUTS ON FEET INCREASE STABILITY WHEN THE CASTERS ARE RAISED
WORKBENCH CASTERS OFFER EASY MOBILITY

NOTE: SIZE THE SIDEKICK SO THAT IT MATCHES THE HEIGHT OF YOUR WORKBENCH TO EXTEND ITS WORKING AREA

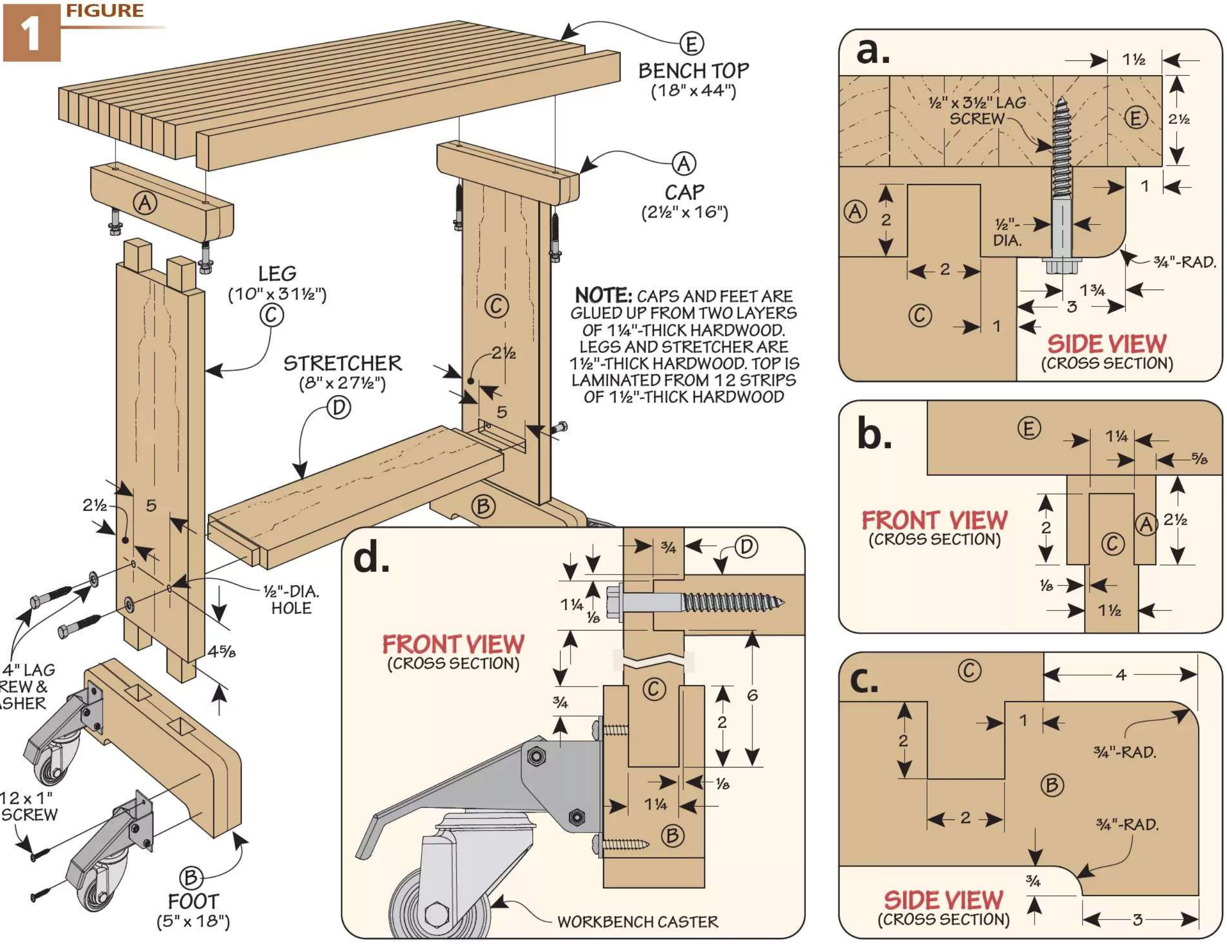
materials & hardware

A	Caps (2)	$2\frac{1}{2}$ x $2\frac{1}{2}$ - 16	**R**	Lg. Dwr. Bottom (1)	1 x $10\frac{7}{16}$ - $\frac{1}{4}$ Ply.
B	Feet (2)	$2\frac{1}{2}$ x 5 - 18	**S**	Sm. Dwr. Bottoms (2)	10 x $5\frac{7}{16}$ - $\frac{1}{4}$ Ply.
C	Legs (2)	$1\frac{1}{2}$ x 10 - $31\frac{1}{2}$	**T**	Bin Backs (2)	4 x $9\frac{1}{2}$ - $\frac{1}{2}$ Ply.
D	Stretcher (1)	$1\frac{1}{2}$ x 8 - $27\frac{1}{2}$	**U**	Bin Fronts (2)	3 x $9\frac{1}{2}$ - $\frac{1}{2}$ Ply.
E	Bench Top (1)	$2\frac{1}{2}$ x 18 - 44	**V**	Bin Sides (4)	3 x $2\frac{3}{4}$ - $\frac{1}{2}$ Ply.
F	Sides (2)	12 x 20 - $\frac{3}{4}$ Ply.	**W**	Bin Bottoms (2)	$2\frac{3}{4}$ x $8\frac{1}{2}$ - $\frac{1}{2}$ Ply.
G	Top/Bottom (2)	12 x 25 - $\frac{3}{4}$ Ply.	**X**	Shelf Top (1)	7 x $9\frac{1}{2}$ - $\frac{3}{4}$ Ply.
H	Center Divider (1)	$11\frac{1}{2}$ x 25 - $\frac{3}{4}$ Ply.	**Y**	Shelf Back (1)	4 x $9\frac{1}{2}$ - $\frac{3}{4}$ Ply.
I	Dwr. Dividers (2)	$11\frac{1}{4}$ x $5\frac{1}{2}$ - $\frac{3}{4}$ Ply.	**Z**	Shelf Braces (2)	$3\frac{1}{2}$ x $5\frac{1}{4}$ - $\frac{3}{4}$ Ply.
J	Back (1)	25 x 19 - $\frac{3}{4}$ Ply.	•	(4) $\frac{1}{2}$" x $3\frac{1}{2}$" Lag Bolts	
K	Door Stop (1)	1 x 2 - $\frac{3}{4}$ Ply.	•	(4) $\frac{1}{2}$" x 4" Lag Bolts	
L	Doors (2)	$12\frac{3}{16}$ x $12\frac{11}{16}$ - $\frac{3}{4}$ Ply.	•	(8) $\frac{1}{2}$" Flat Washers	
M	Lg. Dwr. Frt. (1)	$4\frac{15}{16}$ x $10\frac{15}{16}$ - $\frac{3}{4}$ Ply.	•	(5) Aluminum Pull w/Screws	
N	Sm. Dwr. Frts. (2)	$4\frac{15}{16}$ x $5\frac{15}{16}$ - $\frac{3}{4}$ Ply.	•	(2 pr.) 120° Inset Hinges	
O	Dwr. Sides (6)	$4\frac{15}{16}$ x 11 - $\frac{1}{2}$ Ply.	•	(1 set) Workbench Casters	
P	Lg. Dwr. Back (1)	$4\frac{15}{16}$ x $10\frac{7}{16}$ - $\frac{1}{2}$ Ply.	•	(8) #12 x 1" Ph Sheet Metal Screws	
Q	Sm. Dwr. Backs (2)	$4\frac{15}{16}$ x $5\frac{7}{16}$ - $\frac{1}{2}$ Ply.	•	(33) #8 x $1\frac{1}{4}$" Fh Woodscrews	

▲ Simple plywood bins complement the storage cabinet to keep the necessities close, but not cluttering the top of your primary bench.

Illustrations: Harlan Clark

1 FIGURE


E
BENCH TOP
(18" x 44")
A
CAP
(2½" x 16")
A
LEG
(10" x 31½")
C
STRETCHER
(8" x 27½")
D
C
2½
5
2½
5
½"-DIA.
HOLE
4⅝
½" x 4" LAG
SCREW &
WASHER
#12 x 1"
Ph SCREW
B
FOOT
(5" x 18")
B
a.
1½
½" x 3½" LAG
SCREW
E
2½
1
A
2
½"-
DIA.
¾"-RAD.
2
1¾
3
C
1
SIDE VIEW
(CROSS SECTION)
b.
E
1¼
⅝
FRONT VIEW
(CROSS SECTION)
2
A
2½
C
⅛
1½
c.
C
4
1
2
¾"-RAD.
B
2
¾"-RAD.
¾
SIDE VIEW
(CROSS SECTION)
3
d.
¾
D
1¼
⅛
FRONT VIEW
(CROSS SECTION)
¾
C
6
2
⅛
1¼
B
WORKBENCH CASTER

NOTE: CAPS AND FEET ARE GLUED UP FROM TWO LAYERS OF 1¼"-THICK HARDWOOD. LEGS AND STRETCHER ARE 1½"-THICK HARDWOOD. TOP IS LAMINATED FROM 12 STRIPS OF 1½"-THICK HARDWOOD

Built like a BENCH

Before jumping into the construction, I'll ask you to pause a moment for some ciphering. One of the primary advantages of this project is that it supplements your existing workbench. For that to work best, it needs to match the height of your workbench. Your bench height determines the length of the legs — some of the first parts you make.

END ASSEMBLIES. Figure 1 above outlines the structure. Our attention is focused on the ends. We used maple, but construction-grade Douglas fir or southern yellow pine would be strong options.

The work begins by gluing up blanks for the caps and feet. The narrower caps have a pair of mortises cut into one edge, as you can see in Figures 1a and 1b. I drilled these out with a Forstner bit. There are also counterbored holes for attaching the top. Cut a radius on each end to wrap up.

The feet are similar. These have the same mortises cut to accept the legs, as in Figures 1c and 1d. The end radii are the same too. What's different is a cutout along the lower edge. This provides a more stable stance while in use.

The legs are pretty wide and you'll likely need to glue up each one. Once you determine the final length, the next step is cutting the tenons on each end. I used a dado blade to dial in the thickness of the tenons. In order to separate the solid tenon into two, I used a hand saw. A perfect side-to-side fit isn't necessary — most of the glue strength is in the joint face.

The legs have a mortise on the inside face to hold a stretcher. Drill out the waste and square the ends with a chisel. The mortise also has a pair of counterbored holes to secure the stretcher with lag screws.

The cap, leg, and foot pieces can be glued up. Apply pressure so that the assembly remains flat as the glue dries.

The stretcher is one of the simplest parts in the project. A tenon on each end is all that's required (as in Figure 1d). From here you can join it to the ends.

BENCH TOP. Going along with the bench-like construction, the top is a laminated assembly, as Figure 1 shows. The strips that make up the top are ripped from wide boards and then turned on edge. This puts the stable and tough edge grain on top. The result is a rugged surface. Considering the number of strips (and glue lines), I glued up a few at a time. These smaller segments still fit the planer for surfacing. This means the final glueup results in far fewer joint lines that smooth out quickly.

The top is attached to the caps

with lag screws and washers. I also added some flip-down workbench casters to make this accessory mobile.

STORAGE CASE

You could make an argument that the project is complete at this point. The stretcher works as a shelf. In my shop, a mishmash tends to fill those empty spaces. So in response, I propose a storage cabinet, as in Figure 2.

PLYWOOD & BASIC JOINTS. The case is made from plywood. It features a large compartment behind doors. Along the bottom three drawers sort smaller items. The photos on page 38 show that the case doesn't occupy the whole interior of the base. This arrangement allows the top of the case to still serve as a shelf, just with less headroom. The joinery works with the application: dadoes, grooves, tongues.

Cut the sides first. There are narrow dadoes along the top and bottom ends, as shown in Figures 2b and 2c. A third dado is sized to match the plywood you're using and divides the upper compartment from the drawers. The groove shown in Figure 2a comes last and accepts the back.

There are three horizontal parts. The top and bottom are the same width as the sides. The length of the top and bottom allows the assembled case to fit between the legs. A tongue on each end is sized to fit into the dadoes of the sides. You'll need to cut a groove for the back in these parts as well. The center divider is cut to the same length as the bottom; it just doesn't require tongues. I cut the divider to the same width for now.

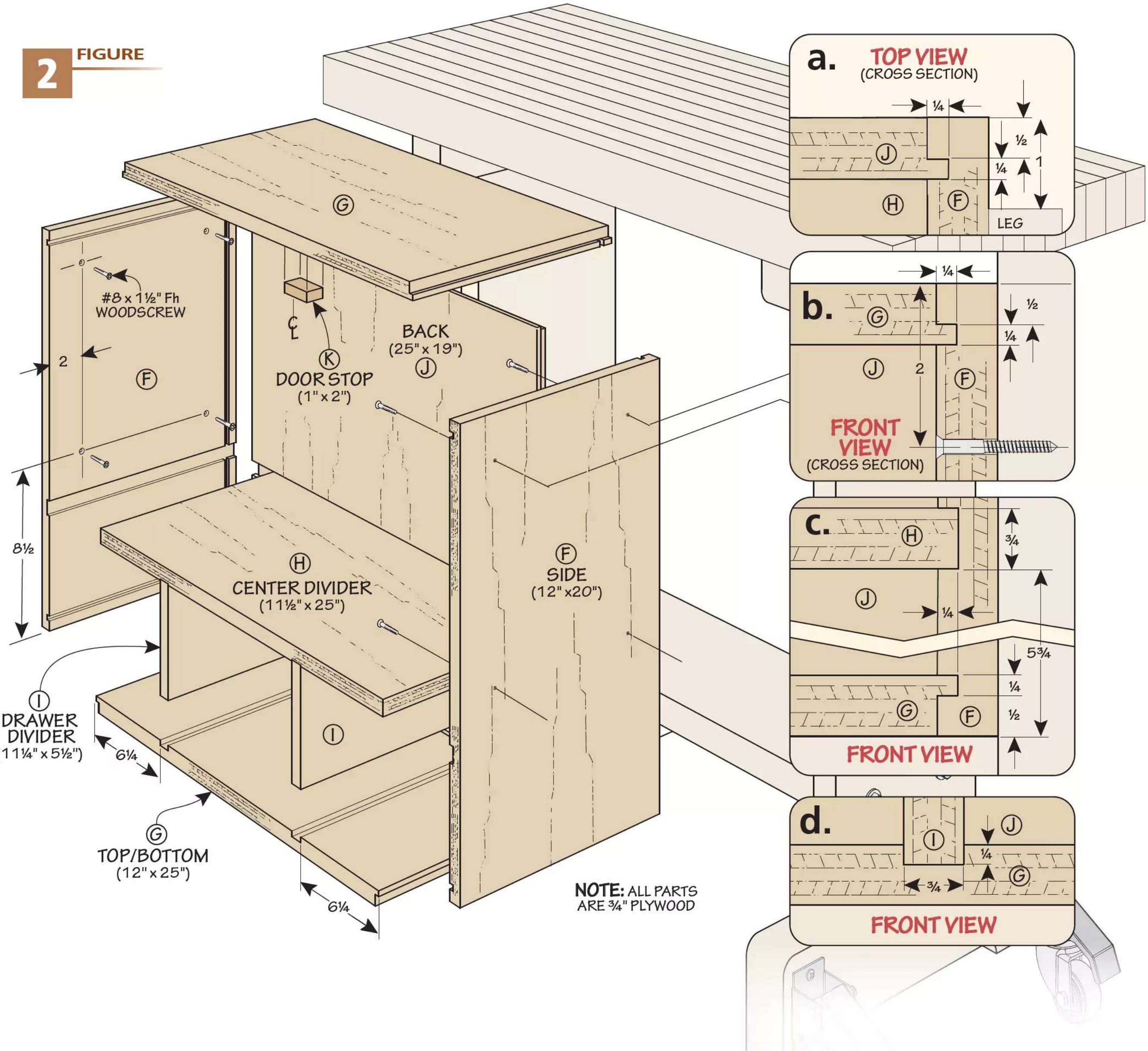
However, both it and the bottom have a pair of matching dadoes that house vertical drawer dividers. This is shown in Figure 2d.

Fit the top, bottom, and sides together with clamps but without glue in order to dial in the overall size of the back panel. Cut a rabbet around the perimeter to form a tongue to fit in the grooves of the case parts.

The back has a dado to hold the back edge of the case middle. Slip the back into the dry assembly and then you can trim the middle to final width.

The remaining pieces to make are the drawer dividers and a door stop. I glued these components in place after gluing up the other case parts.

FIGURE 2


#8 x 1½" Fh WOODSCREW
2
F
8½
G
BACK (25" x 19")
J
K
DOOR STOP (1" x 2")
℄
H
CENTER DIVIDER (11½" x 25")
F
SIDE (12" x 20")
I
DRAWER DIVIDER (11¼" x 5½")
6¼
I
G
TOP/BOTTOM (12" x 25")
6¼
a.
TOP VIEW (CROSS SECTION)
¼
½
¼
1
J
H
F
LEG
b.
¼
½
¼
G
J
2
F
FRONT VIEW (CROSS SECTION)
c.
H
¾
J
¼
5¾
¼
½
G
F
FRONT VIEW
d.
I
J
¼
¾
G
FRONT VIEW

NOTE: ALL PARTS ARE ¾" PLYWOOD

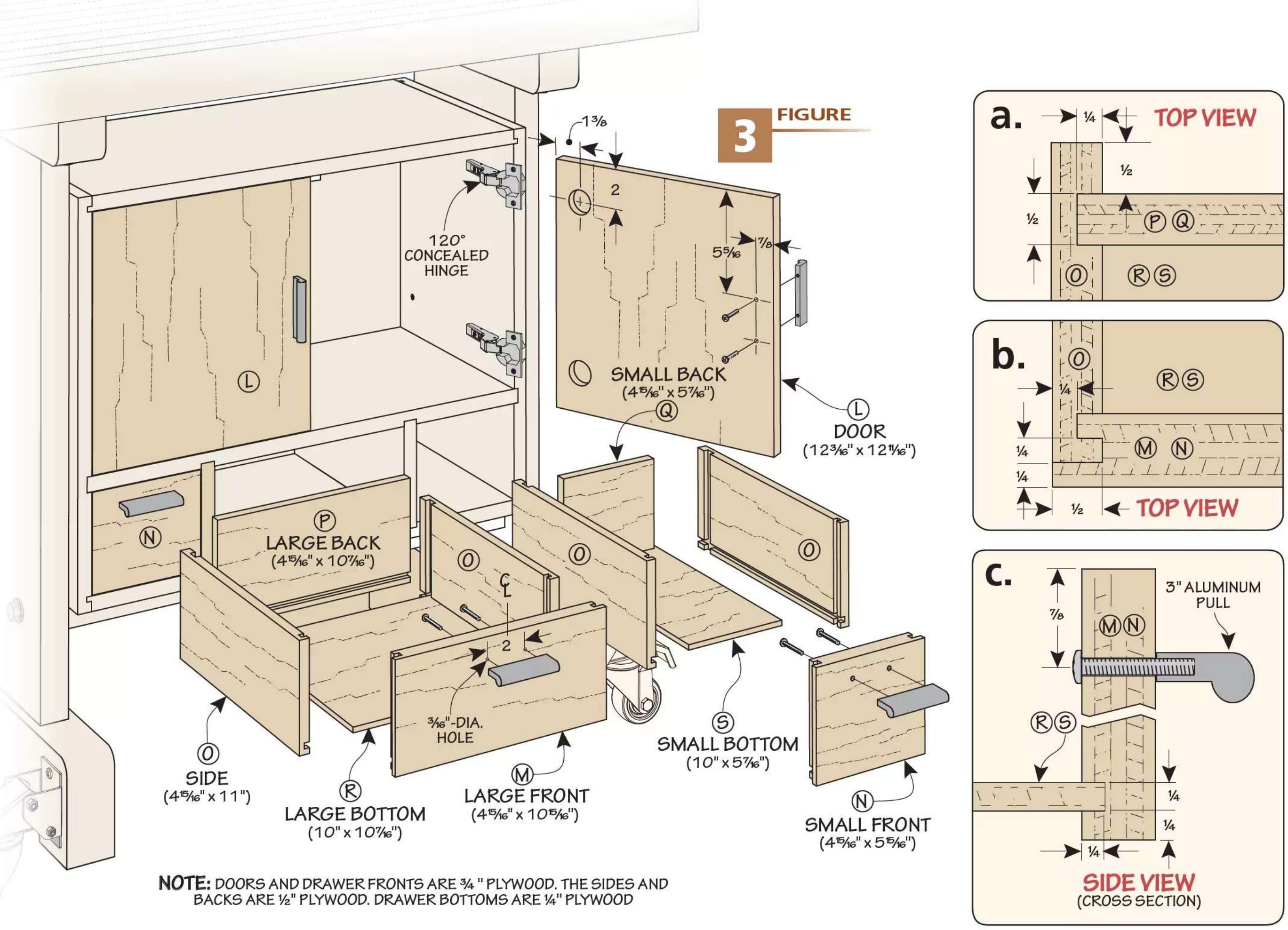


FIGURE 3
1 3/8
2
120° CONCEALED HINGE
5 5/16
7/8
SMALL BACK (4 15/16" x 5 7/16")
Q
L
DOOR (12 3/16" x 12 1/16")
L
N
P
LARGE BACK (4 15/16" x 10 7/16")
O
O
O
C L
2
3/16"-DIA. HOLE
O
SIDE (4 15/16" x 11")
R
LARGE BOTTOM (10" x 10 7/16")
M
LARGE FRONT (4 15/16" x 10 5/16")
S
SMALL BOTTOM (10" x 5 7/16")
N
SMALL FRONT (4 15/16" x 5 5/16")
a.
1/4
TOP VIEW
1/2
1/2
P Q
O
R S
b.
O
R S
1/4
1/4
M N
1/4
1/2
TOP VIEW
c.
7/8
3" ALUMINUM PULL
M N
R S
1/4
1/4
1/4
SIDE VIEW (CROSS SECTION)

NOTE: DOORS AND DRAWER FRONTS ARE 3/4" PLYWOOD. THE SIDES AND BACKS ARE 1/2" PLYWOOD. DRAWER BOTTOMS ARE 1/4" PLYWOOD

Custom Storage **Solutions**

There are two distinct objectives to the remaining parts of this project. The first has to do with wrapping up and enclosing the storage case. The other involves adding some additional storage features on the ends.

SIMPLE DOORS. We'll start at the top of the case and work our way down. The upper compartment is enclosed by two doors. In keeping with the clean lines of the project, I cut the doors from the same plywood that I used for the case.

Baltic birch plywood is ideal for slab doors like these. I find it even more stable than regular plywood. Size the doors for an even gap on all sides. The gaps on mine ended up a strong 1/16".

The doors are attached using concealed hinges, as you can see in Figure 3. These are also called European hinges. The hinges come in several types depending on the type of door and case. Basic hinges open about 110°. I try to find hinges that open at least 120°. For this project, you'll need hinges designed for inset doors. Source information can be found on page 50.

HINGE INSTALLATION. On the door, you need to drill a pair of shallow cup holes on the inside face. This accepts the folding mechanism of the hinge.

Be aware that this is a 35mm hole. I've gotten by with a fractional equivalent bit (1 7/16"), however it's worth getting the correct size. Especially if you plan on using these hinges more often. The location of the cup hole from the edge is critical. So I recommend either drilling the holes at the drill press with a fence, or using a jig.

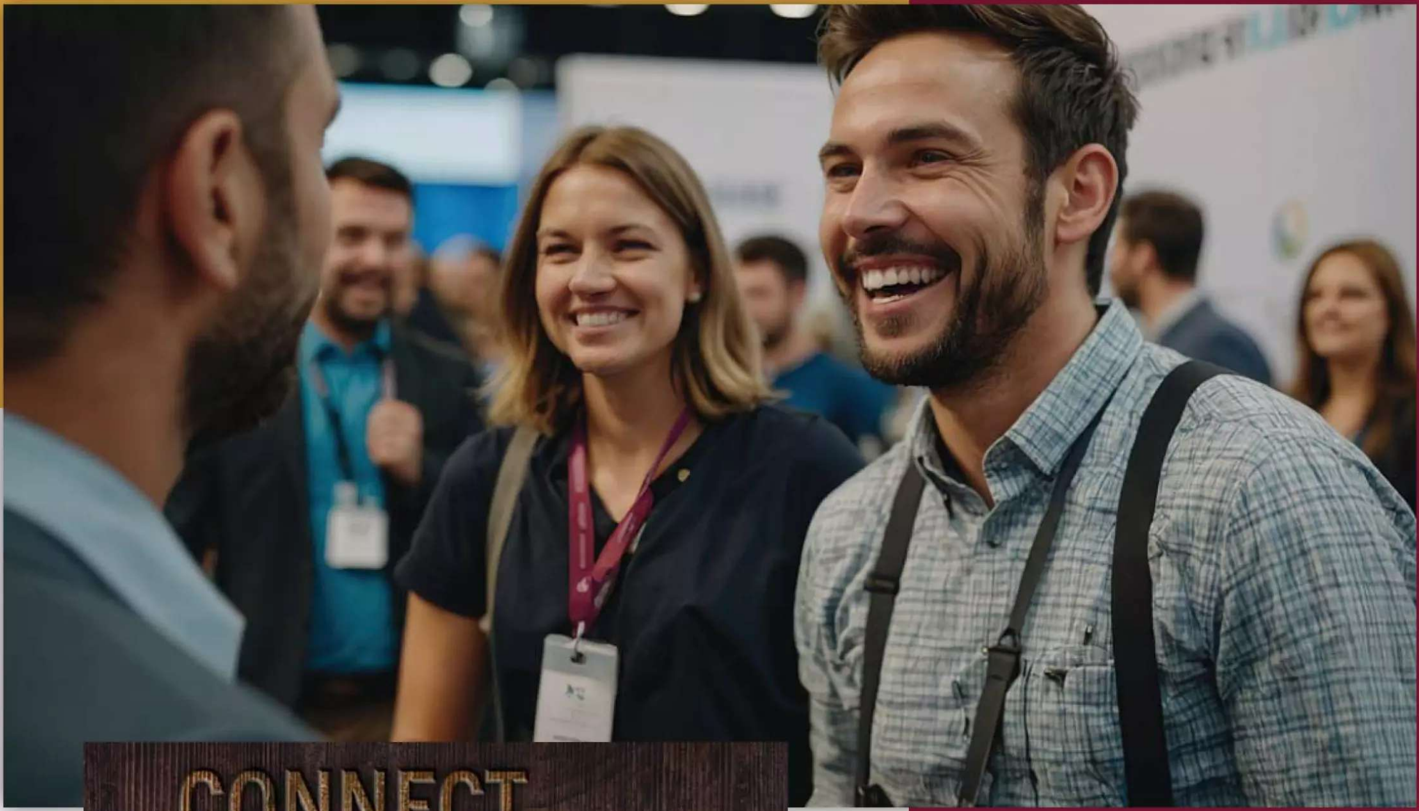
Concealed hinges come apart for easier installation. The door part is secured with two screws. I use a square to keep the component in the correct alignment while driving the screws.

You simply need to drive a pair of screws to anchor the other portion of the hinge to the inside of the case. Then clip the two parts together.

Concealed hinges have adjusting screws. This allows you to fine-tune the door's position. The door should be flush to the front of the case. As much as I love butt hinges, these are right up there. All that's left is to install the pulls. The dimensions are shown in Figure 3.

DRAWERS. Below the doors, the three smaller compartments benefit from having drawers rather than simply open cubbies. While there are two sizes, the construction is the same. So once you have your parts sized, you can set up and cut the joinery in batches.

The front of the drawer is joined to the sides with a locking rabbet, as shown in Figure 3b. Take note that the drawer fronts are made from 3/4" plywood. This joint is formed by cutting a slot across each end of the front. For this cut, the drawer front is held vertically as it passes



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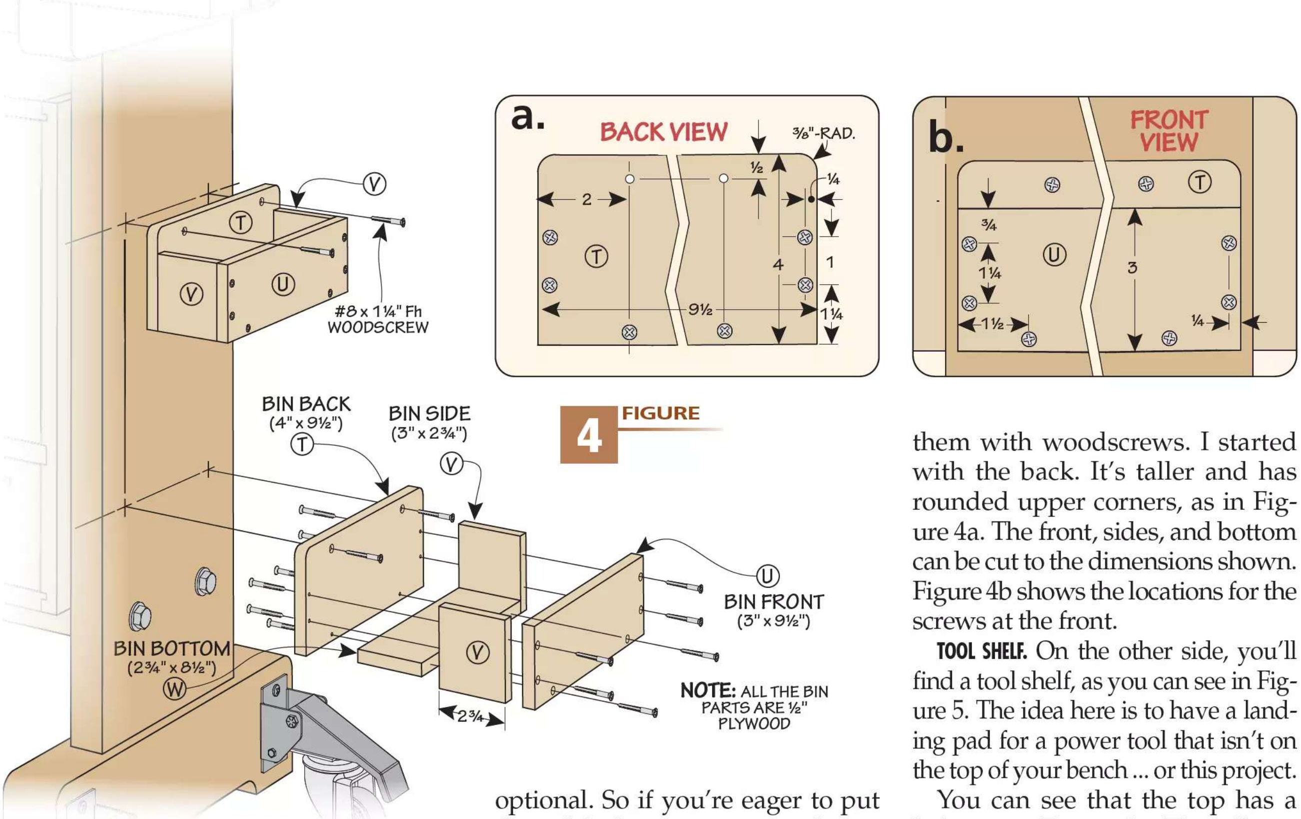
4 FIGURE


#8 x 1¼" Fh WOODSCREW
BIN BACK (4" x 9½") T
BIN SIDE (3" x 2¾") V
BIN FRONT (3" x 9½") U
BIN BOTTOM (2¾" x 8½") W
2¾
NOTE: ALL THE BIN PARTS ARE ½" PLYWOOD
a.
BACK VIEW
⅜"-RAD.
½
¼
2
4
1
9½
1¼
b.
FRONT VIEW
¾
1¼
1½
3
¼

across the dado blade.

The second step is to trim the inner flange back. Lay the front face down and guide the piece with a miter gauge. I used the dado blade to trim the flange rather than adding another blade change into the mix.

To complete the locking rabbet, the drawer sides (1/2" plywood) have a narrow dado at the front end to house the short flange on the front. The size and location of the dado both play a role in how well the joint fits. Take care, as it can be easy to snap off the material ahead of the dado during assembly.

The joinery at the back is considerably simpler. A wider dado cut near the back end of the sides is sized to match the thickness of the drawer back, as illustrated in Figure 3a.

The other bit of joinery you'll need to tackle is a groove along the lower edge to accept the drawer bottom. You can see this in Figure 3c. The drawers use the same pulls as I used on the doors.

STORAGE ACCESSORIES

All that remains to wrap up this project is to make and install a set of racks. To be fair, they're also optional. So if you're eager to put this sidekick to use, you can always add them later.

One other thing: think of these as storage concepts for easy access. Adam Savage from *MythBusters* fame calls this the "first order of retrievability." Consider the tools and supplies you reach for most often. That's what needs to be stored here.

BINS. The first option to consider are the bins shown in Figure 4 above. These are a blank canvas for storing a variety of items. We made two of these general-purpose bins.

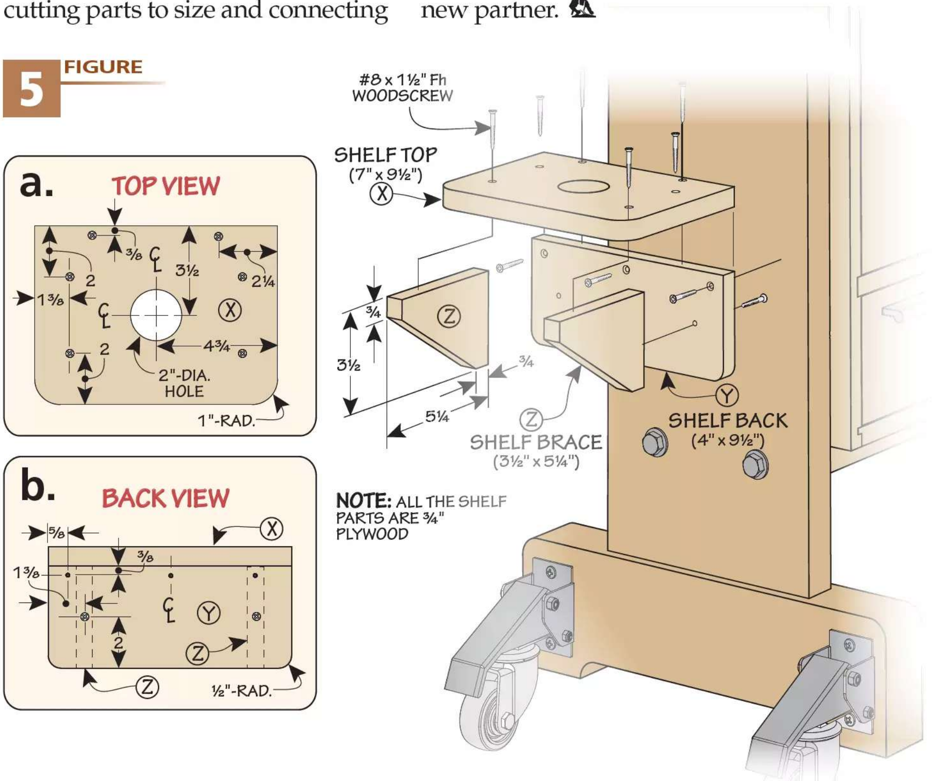
The construction is a matter of cutting parts to size and connecting them with woodscrews. I started with the back. It's taller and has rounded upper corners, as in Figure 4a. The front, sides, and bottom can be cut to the dimensions shown. Figure 4b shows the locations for the screws at the front.

TOOL SHELF. On the other side, you'll find a tool shelf, as you can see in Figure 5. The idea here is to have a landing pad for a power tool that isn't on the top of your bench ... or this project.

You can see that the top has a hole, as in Figure 5a. This allows you to stash a router, or a jigsaw, or even a cordless drill and have it rest securely even with a bit or blade installed. The top is supported by a pair of braces. These are all attached to a plywood back. The back is used for mounting the shelf to the sidekick, as you can see in Figure 5b.

Attach the shelf so that there's enough clearance between it and the bench top for storage. A couple coats of oil or lacquer provide a good amount of protection. Then it's time to introduce your workbench to its new partner.

5 FIGURE


#8 x 1½" Fh WOODSCREW
SHELF TOP (7" x 9½") X
¾
3½
¾
5¼
SHELF BRACE (3½" x 5¼") Z
SHELF BACK (4" x 9½") Y
NOTE: ALL THE SHELF PARTS ARE ¾" PLYWOOD
a.
TOP VIEW
⅜
3½
2¼
2
1⅜
4¾
2
2"-DIA. HOLE
1"-RAD.
b.
BACK VIEW
⅝
⅜
1⅜
2
½"-RAD.

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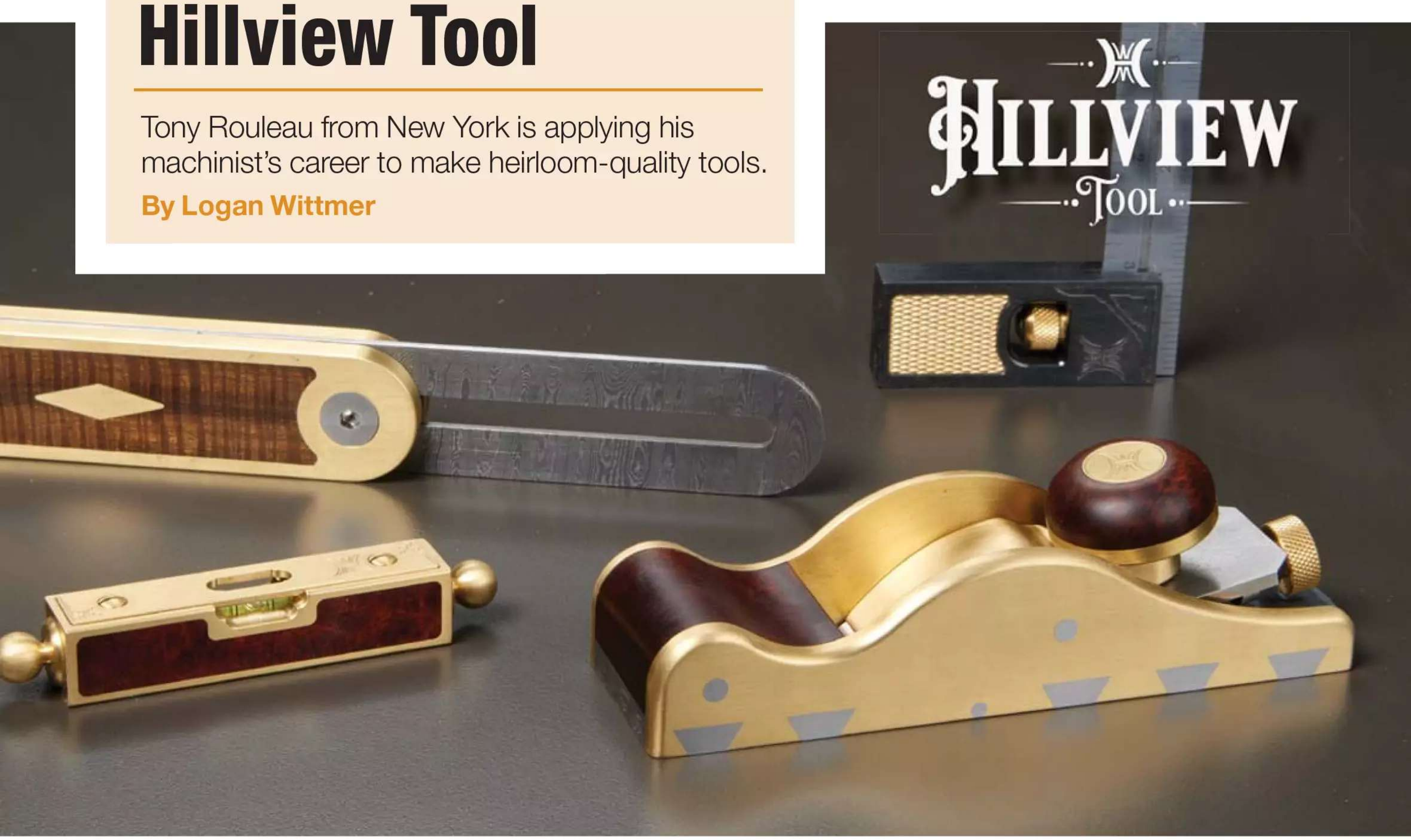
BESPOKE TOOLMAKER

Hillview Tool

Tony Rouleau from New York is applying his machinist's career to make heirloom-quality tools.

By Logan Wittmer



PHOTOS PROVIDED BY TONY ROULEAU & LOGAN WITTMER

The woodworking community is a wonderful thing. I was first introduced to Tony Rouleau through Jamie Harpster (from the non-profit Plane Wellness). Looking at Tony's tools, I instantly recognized them and put two and two together: Tony was the machine behind Hillview Tool.

Give me a little background on Hillview Tool. How did you end up as a toolmaker?

My company and I are located in a small town about an hour north of Albany, NY, called Greenwich, on the edge of the Adirondack Mountains. My shop, located in the walk-out basement of my home, is built on a family farm that was started by my great-grandfather and was run mainly by my grandparents. He named it Hillview Farm.

I've always been a woodworker. Around the age of 11 or 12, I got my first scroll saw, and things blossomed from there. Out of high school, I considered mechanical engineering but stumbled upon machining and fell in love with it. I went to trade school to become a machinist and have been for almost 30 years now. In the machining trades, making your own tools for specific jobs is not uncommon, which I have always enjoyed. In 2012, I took a job in a machine shop where the owner let us use the equipment after hours (which is unheard of in the industry because of the cost of the equipment). From there, I tinkered and started making branding irons, which took off on a small scale in my first business venture. In the summer of 2016, I was asked to do something for a giveaway for a podcast called Makercast. Many woodworkers and makers were involved in the giveaway, so I felt compelled to make a real effort. That's when the block plane came along. After that, I started making tools at night in the machine shop after hours. Slowly, I saved enough to start adding equipment to my home shop. In 2022, I was able to make tools completely in my shop. (From 2016 to 2023, I burnt the candle at both ends, working as a machinist during the day and toolmaking at night). My wife Mackenzie encouraged me to go full-time tool making, and in 2023, I left my day job, and Hillview Tool became my full-time job.

What did you see as a need in the community?

From the block plane giveaway, I had multiple people approach me about making them a plane, including Jay Bates, a woodworker on YouTube. After making the planes, I reached out to Jay, asking if he was happy with his plane, and he told me he intended to do a review video on it. Demand for the block plane skyrocketed from that video, which thrust me into serious toolmaking.

Shortly after the block plane, I started making brass double squares of my own design, and those proved to be popular and are my most made tools to date. I branched out into bevel gauges, which have also gained traction. I have a protractor I offer as well. I didn't necessarily see a need for something in the woodworking world; I just made things I would want to use, and I think they are cool. I remember the first machinist tools I ever got and still have. They were of incredible quality, and when I held them, they made me feel like a better craftsman. I try to do that with the tools I make. I love that almost every aspect of the tools I make can be customized by the end user, and I love working with people to bring that to life. Take, for example, a double square; you can pick the size of the blade, the metal the body is made from, and even the inlay material. You can have Damascus steel as an inlay or brass inlays custom engraved with a logo. I encourage people to make the tools they buy theirs. When people hold their custom tools made by me, I want them to have that same feeling that I had way back when.

View Tony's Work at *HillviewTool.com*

What would you guess the future holds for Hillview? New Products and expanding the line?

I want to keep creating new and exciting tools (I have a trammel/compass I'm working on that should be released soon). Someday, I'd like to eventually move out of my basement shop and into something with more room, but I make it work. The family and dogs are just up the stairs, which is a bonus.

At the end of the day, I really have to give it to my friends, family, and customers. Thank you for your support and love. Thank you to my maker friends who have shared pictures and videos of the tools I've made and have helped me build what I have today. Thank you to my customers for all your support, trust, and patience.

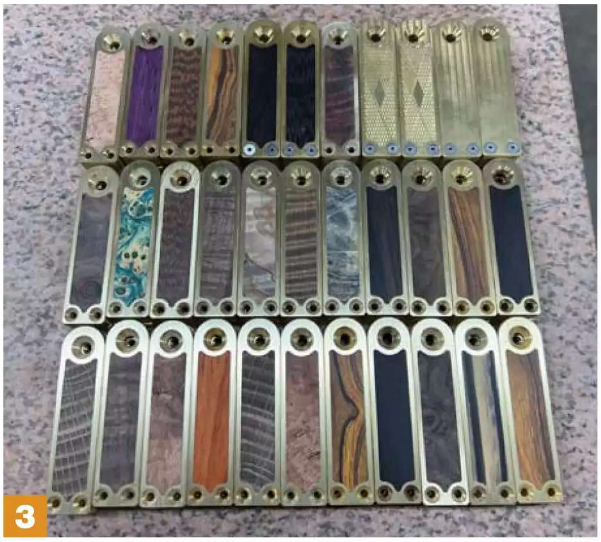
1 All of the Hillview Tools are created at Tony's home shop.

2 Utilizing his training as a machinist, Tony hand makes each and every one of his tools.

3 Each tool created is unique —choose your materials on your heirloom tool.

1

2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Birch	4/4	Select	3.95	$108.00
Butternut	4/4	1C	3.65	$ 98.00
Cedar (Aromatic Red)	4/4	1C+Btr.	3.35	$ 95.00
Cherry	4/4	Select	4.90	$118.00
Cypress	4/4	Select	4.60	$118.00
Hickory - Pecan	4/4	Select	3.00	$108.00
Mahogany (African)	4/4	Select	5.50	$125.00
Maple (Hard)	4/4	Select	5.00	$125.00
Maple (Soft)	4/4	Select	4.85	$119.00
Oak (Red)	4/4	Select	3.15	$101.00
Oak (White)	4/4	Select	7.00	$150.00
White Oak (Quarter Sawn)	4/4		8.95	$180.00
Poplar	4/4	Select	2.85	$ 95.00
Walnut	4/4	Select	8.25	$165.00
White Pine (Soft)	4/4	F.G.	2.00	$ 79.00
Yellow Pine (Soft)	4/4	Clear	2.20	$ 88.00

Above prices are for 100' quantities of kiln dried rough lumber sold by the Bd. Ft. FOB Mayodan, NC. Call for quantity discounts. Other sizes and grades available.

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Rudolf Steiner School

In the basement of a Manhattan low-rise, Yoav Liberman is introducing kids to woodworking during the school day.

By Logan Wittmer

If you've followed our website for any time, you're bound to know the name Yoav Liberman. Yoav has contributed to our website for over a decade and has published numerous books on various topics. With furniture having been displayed in high-end galleries across the US, it's safe to say that Yoav's designs are unique and lean heavily upon his formal training as an architect (Israel Institute of Technology). So, what does a nationally recognized, architect-turned woodworker do? Teach young children woodworking, of course.

Last summer, I had the chance to visit Yoav at one of the many schools he teaches at — the Rudolf Steiner School in Manhattan. Located just a block off of Central Park and around the corner from the Metropolitan Museum of Art, the Steiner School sits in a historic low-rise building. The entryway is full of kids walking to class or parents dropping them off for the day.

In the basement of this esteemed school is something unexpected — a woodshop lined with benches and tools. The class quickly fills with children from 4th grade to high school. They immediately get into the shop, grab their projects, and start getting to work.

The Steiner philosophy is simple — teach kids by encouraging and curating their creativity and imagination and allowing them to use their hands to learn. None of this is more evident than in Mr. Liberman's class. Here, the kids start by simply whittling walking sticks in the earlier grades and slowly go through spoon carving, character carving, stool making, and some simple mechanical toys when they reach high school.

Having spent a few days in Yoav's class, watching these kids was amazing. Some of them took to their work like a fish to water. For others, it took a bit of convincing to focus on their projects rather than goofing around with each other. But, what is evident in Yoav's class is that these kids flourish while being taught to use their hands. Even though the kids in your life may not go to a Steiner school, I encourage you to take this approach and let them learn with their hands.

1

2

3

1 Between projects, students are allowed (and encouraged) to explore various techniques, such as woodburning.

2 Making small wood critters is one of the favorite projects among students.

3 Stool making introduces real-world applications of woodworking techniques.

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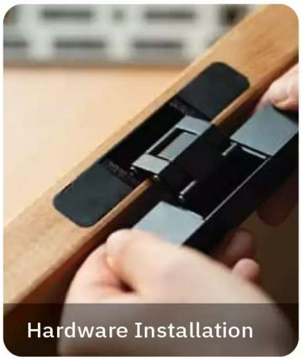
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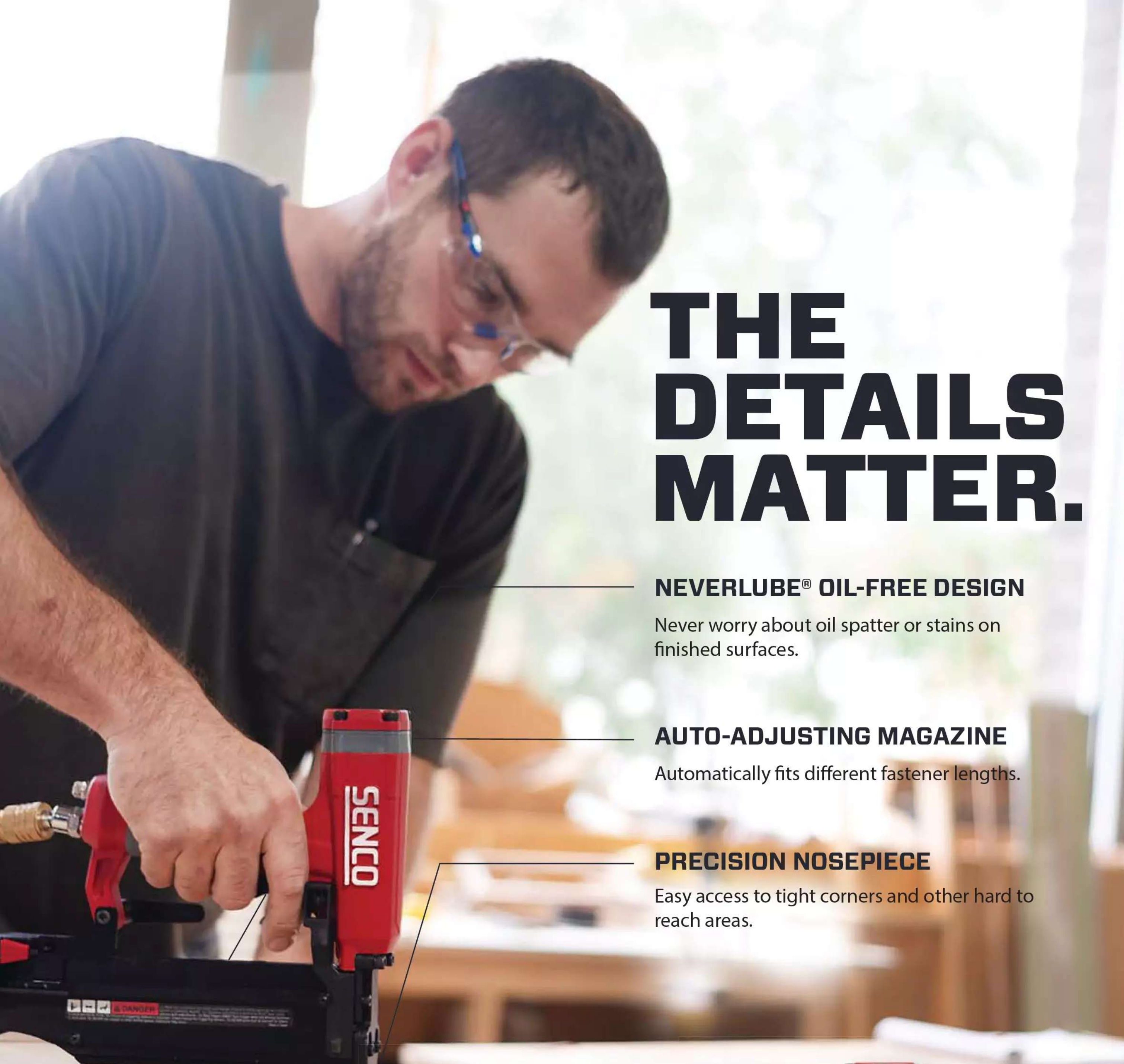

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